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REVIEW OF THE GENUS HYMENOCALLIS.

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INTRODUCTION

Because of the paucity and general poor quality of the herbarium material, the lack of precise information about the distribution and variation of the species, and the fact that no material was preserved of many of the species described between 1753 and 1853, there has been much confusion regarding the limits and nomenclature of the species of *Hymenocallis*. The naming of a number of species that flowered at Kew during 1953 involved the critical revision of much of the herbarium material, and, as is so often the case with long-established genera of the *Amaryllidaceae*, it was ultimately found necessary to review the whole genus before any satisfactory conclusions could be reached. The results of this work are presented below. It is now quite obvious that much more material and information about the variation of the species in the wild is necessary before a competent taxonomic account can be prepared, and it is hoped that the following resumé of what is known about the genus may be useful to those in a position to undertake the further work that is necessary.

In addition to the material in the Kew Herbarium, that in the British Museum Herbarium has also been examined by kind permission of the Keeper of the Department of Botany, while Sir William Wright Smith very kindly sent on loan certain specimens from the Edinburgh Herbarium. Collections from these herbaria are indicated in the enumerations below by the letters BM and E respectively.

HISTORY OF THE GENUS

An account, illustrated by a black and white drawing, of a species of *Hymenocallis* (either *H. caribaea* or *H. expansa*) growing near Nombre de Dios, not far from Porto Bello, Panama, was given in 1535 by Oviedo (*Historia General y Natural de las Indias*, Lib. XI. Cap. VIII. t. 4. fig. 6 : 1535 ; ed. Rios, 1, 318, t. 4, fig. 6 : 1851). A number of seventeenth century writers* referred to the "Lys blanc" or "White

* Du Tetre, *Hist. Gen. Antilles*, 2, 110 (1667-71) ; Rochefort, *Hist. Nat. Mor. Iles Antilles Amer. ed. dernière*, 132 (1681) ; John de Laet, *Nov. Ort. Descr. Indie Occ.* XVIII. 690 (1633) ; Ligon, *True & Exact Hist. Isl. Barbadoes*, 99 (1657).

Lilly" found growing wild on the islands of the Caribbean, and these were identified by Sir Hans Sloane with the plant he saw and collected during his travels in the Caribbean, and which he described in his *Catalogus Plantarum Insulae Jamaicae*, 115 (1694) as "*Narcissus totus albus latifolius polyanthos major odoratus staminibus sex e tubi amplius margine extantibus*." It is impossible to identify the species from this, but from the much fuller account given by Sloane in his *Voyage to the Islands Madera . . . Jamaica*, 244 (1707) it is evident that his species is the one that later became known as *H. caymanensis* Herb., and for which the right name would seem to be *H. latifolia* (Mill.) Roem. (see below)—an identification confirmed by the specimen in the Sloane Herbarium at the British Museum (Natural History).

Tournefort had one species of *Hymenocallis* in his *Institutiones Rei Herbariae*, 358 (1700) under the phrase name "*Narcissus Americanus, flore multiplici albo, odore Balsami Peruviani*", but though he cited Sloane's *Catalogus*, it is impossible without seeing his specimen to say whether or not he was dealing with the same species as Sloane.

The following year (1701) an excellent figure and description of a plant grown at Amsterdam was published by Commelyn (*Horti Med. Amstel. Rar. Pl. Descrip. & Ic.* 173, t. 87) who identified it with the plants described by Sloane and Tournefort. His plant is certainly not the same as Sloane's and belongs to a different species, namely *H. caribaea* (L. emend. Gawl.) Herb.

No more species of *Hymenocallis* were recorded until the years 1730-2, and then three were figured and described in quick succession. First, a plant grown in the Chelsea Physic Garden, of which John Martyn gave an account in his *Historia Plantarum Rariorum*, 27, cum tab. (post 1730) under Sloane's phrase-name. The flowers are too small for Sloane's plant, and are much more like those of Commelyn's. They are, however, somewhat larger, and, moreover, are described as shortly pedicellate; this, coupled with the fact that the plant came from Barbados, points to it being *H. fragrans* (Salisb.) Salisb. and it agrees better with that species than with any other. The next species is the one included by Mark Catesby in his *Natural History of Carolina, Florida and the Bahama Islands*, 1, App. 5, t. 5 (1731 ?) ed. rev. Edwards (1754), as "*Lilio-Narcissus Polianthus, flore albo*." It came from a bog "on the *Savanna* river within the precinct of *Georgia*" and bears a striking resemblance to the Old World *Pancratium maritimum* in the flower, but the leaves were said to be deep shining green (not glaucous as in *P. maritimum*); subsequent collections suggest that Catesby was, in truth, describing and figuring an American *Hymenocallis* and not the Old World *Pancratium*. Linnaeus, who knew the plant solely from Catesby's account, named it *Pancratium carolinianum* (Sp. Pl. 1, 291 : 1753), and it must now bear the name *Hymenocallis caroliniana* (L.) Herb.

The last of the three species described between 1730 and 1732 is the one that was grown in James Sherard's garden at Eltham, and which Dillenius figured and described as "*Pancratium mexicanum, flore gemello candido*" in his *Hortus Elthamensis*, 299, t. 222 fig. 289 (1732). It was named *Pancratium mexicanum* by Linnaeus (Sp. Pl. 1, 290 : 1753), who may have seen a living specimen in Clifford's garden and in the

Leyden Botanic Garden, and though wrongly identified with at least two other species in subsequent years, it certainly ranks as distinct and takes the name *Hymenocallis dillenii* Roem.

Two more species became known in 1752, namely those described and figured by D. Christopher Jacob Trew in his *Plantae Selectae* . . . Pinxit Ehret, Decas 3, p. 6 as "*Pancratium foliis ensiformibus, spatha multiflora, floribus magnis candidis fragrantibus*" (t. 27), which appears to be a form of *H. littoralis* (Jacq.) Salisb., and "*Pancratium foliis amplius ovatis acutis petiolatis spatha multiflora, floribus minoribus candidis fragrantibus*" (t. 28), which is *H. ovata* (Mill.) Sweet. Both were grown at Chelsea and enumerated by Rand, *Hortus Chelsianus*, 150 (1739 ?).

Trew's work did not appear in time for the species to be included in the first edition of Linnaeus's *Species Plantarum* (1753), but all the other plants mentioned above were accounted for in that publication. As already mentioned, Dillenius's plant was named *Pancratium mexicanum* L. and Catesby's *P. carolinianum* L.; all the others were included in a third species, *P. caribaeum* L., a confusion which was the source of much trouble in later years.

Until 1812 all the species of "Spider-lily" were included in *Pancratium*, but in that year Richard A. Salisbury segregated them as a distinct genus for which, in allusion to the "beautiful membrane" which forms the staminal cup, he proposed the name *Hymenocallis*. His work was, however, disregarded by most botanists for many years—William Herbert was a notable exception—and even as late as 1837 species of *Hymenocallis* were still referred to *Pancratium*. However, after the publication of Herbert's *Amaryllidaceae* in 1837 the genus *Hymenocallis* became generally accepted, and it is now universally recognised. A complete but uncritical synopsis of the species was given by Roemer (*Syn. Monogr.* 4, 166–177) in 1847; three years later Kunth published another full review (*Enum. Pl.* 5, 664–680; 1850), while Baker gave an account of the genus in 1888 (*Handb. Amaryll.* 122–127). Since then no comprehensive appraisal of the species has appeared.

TAXONOMIC CRITERIA

Habit of Growth. In certain species the leaves die off during the later part of the summer, after the flowers have withered, and the bulb then passes into a resting state. The bulb remains dormant for some considerable time—from August to March for plants of *H. dillenii* Roem. (syn. *H. concinna* Baker) in cultivation according to Sprenger (see below)—and then new leaves grow out, to be followed by an inflorescence. In due time leaves and inflorescence (or infructescence) die away and the bulb once more enters the resting state. This life-cycle is characteristic of *H. harrisiana* Herb. and *H. horsmanni* Baker in addition to *H. dillenii* mentioned above. Moreover, these species produce very few (3–5) leaves each year and few (often 2)-flowered scapes. In striking contrast are species like *H. speciosa* (Salisb.) Salisb. which have several leaves persisting for considerably more than a year. New leaves (7–9 or more) and an inflorescence arise among the existing leaves, and for much of the year the bulb carries many leaves, and at no time is it

dormant. Unfortunately nothing seems to be recorded about the habit of growth of a number of species, while for some which are obviously evergreen it is not known whether the leaves arise continuously throughout the year, or, as in *H. speciosa*, all arise together along with the inflorescence. Here is a matter to which those who have the opportunity of studying living plants might well direct their attention, for the habit of growth is surely a very valuable taxonomic character.

Leaves. These provide very useful criteria, and most of the species fall into one or other of a few leaf-types. In the group of species comprising *H. tubiflora* Salisb., *H. cordifolia* Micheli, *H. ovata* (Mill.) Sweet, *H. schizostephana* Worsley, *H. speciosa* (Salisb.) Salisb. and *H. fragrans* (Salisb.) Salisb., the leaves have a broad blade very clearly set off from a distinct petiole. Two species only, *H. choretis* Hemsl. and *H. eucharidifolia* Baker, resemble the petiolate species so far as the blade is concerned but lack the petiole. *H. dillenii*, *H. harrisiana*, and *H. horsmanni* have more or less oblanceolate leaves which taper to a very narrow petiolar basal part. The *caribaea* alliance—*H. caribaea* (L.) Herb., *H. expansa* (Herb.) Herb., *H. latifolia* (Mill.) Roem., *H. tenuifolia* Herb., and *H. pedalis* Herb.—is characterised by the leaves being very broadly strap-shaped above the middle, but tapering downwards and becoming considerably narrower in the lowest third. Much narrower strap-shaped leaves, which are also nearly always tapered and still narrower towards the base, characterise *H. littoralis* (Jacq.) Salisb., *H. acutifolia* (Herb.) Sweet, *H. praticola* Britt., *H. rotata* (Gawl.) Herb., *H. galvestonensis* (Herb.) Baker, and *H. caroliniana* (L.) Herb. Finally there are a few species with very narrow linear leaves, namely *H. sonorensis* Standl., *H. graminifolia* Greenm., *H. palmeri* S. Wats. and *H. humilis* S. Wats., though it must be noted that the status of at least the last two is doubtful and they may be forms of species with broader leaves.

Information about the variation in the size and shape of the leaves is not often available; dried specimens rarely have more than one or two leaves, and these are often incomplete, especially in species with large leaves. Consequently the range in size and shape is still imperfectly known for most species.

Inflorescence. Information about the variation in the height of the scape and size of the spathes is too meagre for these characters to be of value at present. The number of flowers, however, is sometimes useful, for some species, e.g. *H. rotata* and *H. harrisiana*, normally have very few flowers, 1–4 but commonly 2, whereas other species, e.g. *H. littoralis*, *H. pedalis*, and *H. caribaea* normally have many flowers—7 to 12 or more. As usual with bulbous plants, small bulbs produce fewer flowers than fully grown bulbs, and this tends to mask the usefulness of this character.

Flowers. The size of the perigone, as expressed in terms of the length of the tube and segments, varies greatly between different species and seems to be a reliable character, but in the absence of information about the variation in populations of plants, it is quite impossible to be sure of the taxonomic value of such a quantitative criterion. The species of the *caribaea* alliance, for instance, differ as follows:

		Length of Tube	Length of Segments
<i>H. caribaea</i> ...	...	4-6.5 cm.	(8)—9—11-(12) cm.
<i>H. expansa</i> ...	...	8-10.6 cm.	9-14.5 cm.
<i>H. latifolia</i> ...	...	(10)-11-15 cm.	9-12.5-(14) cm.
<i>H. tenuifolia</i> ...	...	10-14 cm.	8-11 cm.
<i>H. pedalis</i> ...	...	(14.5)-17-19.5- (22.5) cm.	10-13.5 cm.

The first three are very similar to one another in other respects, and all are natives of the West Indies ; are they correctly placed as distinct species, or are they varieties of one polymorphic species ? The differences between *H. caribaea* and *H. latifolia* in flower-size are so great, that on the basis of our present knowledge, it is advisable to continue to maintain them as distinct species, but further information might well show this to be wrong. *H. tenuifolia* stands somewhat apart on account of its very slender flowers and smaller staminal cup, while *H. pedalis* is distinguished by its very long flowers and by its geographical distribution in northern South America. Whether or not they are indeed distinct species can only be satisfactorily assessed when more is known about them.

The androecium provides useful taxonomic characters, since in each species the form of the staminal cup is constant and its size varies within small limits, as does the length of the filaments. A species with a large cup and short filaments looks very different from a species with a small cup and long filaments even in the dried state—and the size alone can be most useful as a diagnostic character. In addition the cup may be quite different in form in different species ; in some it is funnel-form with the margins erect, in others funnel-form with the upper part rotate, or the cup may be tubulose in the basal part and then cupular or almost rotate. Unfortunately the shape is often completely obliterated in dried specimens, in fact the latter may be misleading since it is possible to press a cup with erect margins in such a way that the upper part is spread out and appears as though it had been rotate.

The length of the style does not seem to be particularly useful, nor does the degree of its exertion beyond the staminal cup, though, again, further observation is required before one can be certain. But the number of ovules in each cell of the ovary is a very good character, for while the majority of species have two, rarely three, ovules in each cell, there is a number of species with more numerous ovules, four to eight per cell.

In the key which follows, the primary divisions are based on the form of the leaves, but where there is a possibility of confusion (as, e.g. in herbarium material where only a single leaf may be available) species are put under both alternatives.

KEY TO THE SPECIES.

- (1) leaves or leaf-blades (which are shortly narrowed to or abruptly set off from a well-marked petiole 6-30 cm. long), broad elliptic or broad oblong-elliptic to ovate, cuneate or rounded at the base, (15)-20-46 cm. long, 6.2-15 cm. wide (2)

leaves linear or lorate or ensiform or oblanceolate or suboblong, long-tapered downwards, 10-60 cm. long and 0.4-5 cm. wide ; if exceeding 5 cm. in width, then broadly lorate to broadly oblong-ensiform in the upper half, tapered downwards and usually very narrow in the lowest third, 30-90 cm. long and 5-10 cm. wide (12)

- (2) leaves not petiolate (3)
 leaves clearly petiolate (4)
- (3) perigone-tube 9.5-10.5 cm. long ; filaments (2)-2.5-3 cm. long.
 Hab. ? *eucharidifolia*
 perigone-tube 14-15 cm. long ; filaments 3.3-3.5 cm. long.
 Mexico. *choretis*
- (4) leaf-blades ovate, cordate at base. Mexico. *cordifolia*
 leaf-blades broad elliptic or broad oblong-elliptic, cuneate at base
 (5)
- (5) perigone-tube 12.5-20 cm. long ; ovules 4 or 5 in each cell.
 Northern South America. *tubiflora*
 perigone-tube from (3)-4.5-5 cm. long to 9.5-10.5 cm. long ;
 ovules (where known) 2 (rarely 3) in each cell. (6)
- (6) staminal cup deeply split between the filaments, sometimes almost
 to the base. Brazil. *schizostephana*
 staminal cup toothed, but not split downwards (7)
- (7) leaf-blades very broad elliptic, about twice as long as broad,
 10.5-30 cm. long, 4-15 cm. wide (8)
 leaf-blades elliptic or oblong-elliptic, three to five times as long as
 broad, 26-65.5 cm. long and (6.3)-8-15.5 cm. wide (10)
- (8) perigone-tube (3)-4.5-5 cm. long ; filaments 3.5-4 cm. long ;
 leaf-blades 15.5-30 cm. long, 7.5-15 cm. wide. West Indies ?
ovata
 perigone-tube (5)-6.3-7 cm. long ; filaments 2.8-3 cm. long (9)
- (9) leaf-blades 10.5 cm. long, 4 cm. wide. West Indies ? *ovalifolia*
 leaf-blades 18-23 cm. long, 7.5-12.5 cm. wide. Guatemala ?
ornata
- (10) perigone-tube 9.5-10.5 cm. long, longer than the segments which
 are 6.5-7.5 cm. long and 3-4 mm. wide ; leaf-blades 26-30 cm.
 long, 7.5-9 cm. wide ; petioles not exceeding 4 cm. (and perhaps
 only the sheathing part of the leaf). Hab. ? *eucharidifolia*
 perigone-tube 6-9 cm. long, shorter than the segments which are
 9-15 cm. long and 6-7-(10) mm. wide (11)
- (11) leaf-blades 32-33 cm. long, 6.3-8 cm. wide ; petioles 6-7 cm. long.
 West Indies (Barbados) *fragrans*
 leaf-blades 26-65.5 cm. long, 8-15.5 cm. wide ; petioles 9-30 cm.
 long. West Indies. *speciosa*

- (12) leaves (4)–5–10 cm. wide (13)
 leaves 0.4–3 cm. wide, if to 4 cm. wide then 60–120 cm. long . . . (22)
- (13) leaves rounded at apex. Bahama Is. *arenicola*
 leaves acute or bluntly acute at apex (14)
- (14) perigone-tube 4–6.5 cm. long, shorter than the segments . . . (15)
 perigone-tube at least 8 cm. long and usually more . . . (16)
- (15) perigone-segments 5.5–6 cm. long ; staminal cup 1.3–2 cm. long,
 filaments 2.5–3 cm. long ; leaves 4, deciduous. Mexico. *dillenii*
 perigone-segments (8)–9–11–(12) cm. long ; staminal cup (2)–
 2.5–3 cm. long, filaments 3–5 cm. long ; leaves many, evergreen.
 West Indies. *caribaea*
- (16) perigone-tube shorter than the segments, tube 8–10.6 cm. long,
 segments 9–14.5 cm. long. West Indies. *expansa*
 perigone-tube longer than the segments (17)
- (17) perigone-tube (14.5)–17.5–22.5 cm. long, segments 10–13.5–
 (15 ?) cm. long. South America. *pedalis*
 perigone-tube 9–15 cm. long, segments 6–12.5 cm. long . . . (18)
- (18) staminal cup less than 2 cm. long (19)
 staminal cup more than 2 cm. long (20)
- (19) leaves 3–4, deciduous, 20–34 cm. long and 3–5.1 cm. wide ; peri-
 gone-segments 6–7.5 cm. long ; margins of staminal cup spreading,
 filaments 2.5–3.5 cm. long. Mexico. *harrisiana*
 leaves many, evergreen, 40–67 cm. long and 5.5–6.4 cm. wide ;
 perigone-segments 10–11 cm. long ; margins of staminal cup
 erect, filaments 5.5 cm. long. Guatemala ? *tenuiflora*
- (20) perigone-tube 9–10 cm. long, segments 7–7.5 cm. long. West
 Indies (Dominica) *expansa* var. ?
 perigone-tube 10–15 cm. long, segments 8–12.5 cm. long . . . (21)
- (21) leaves few, deciduous, thin in texture, oblanceolate, long tapered
 to the base, 26–28 cm. long, 2.5–4 cm. wide. Mexico. *horsmanni*
 leaves many, evergreen, thick in texture, broad ensiform or broad
 lorate, tapered downwards into a narrow basal part, 50–90 cm.
 long, 6.2–10 cm. wide. West Indies. *latifolia*
- (22) leaves rounded at apex. Bahamas. *arenicola*
 leaves acute or bluntly acute at apex (23)
- (23) staminal cup 4.5–5 cm. long and funnel-form, filaments 1–1.5 cm.
 long. N. America. *caroliniana*
 staminal cup 1.3–3 cm. long, if 3.5–5 cm. long (*H. rotata*) then wide
 cupular or rotate from a short tubulose base and filaments 2.5–
 3 cm. long (24)

- (24) filaments 1.4–2 cm. long (25)
 filaments 2.5–6 cm. long (27)
- (25) leaves 30–35 cm. long and 1.2–1.5 cm. wide, or 30–47 cm. long and
 2.5–3 cm. wide ; perigone-tube 5–7 cm. long. Texas and
 Louisiana. *galvestonensis*
 leaves 10–20 cm. long and 4–8 mm. wide ; perigone-tube 3–4 cm.
 long (26)
- (26) staminal cup 3–3.2 cm. long ; leaves 15–20 cm. (or more) long,
 5–8 mm. wide ; perigone-tube 3.5–4 cm. long, segments 6.5–7 cm.
 long. Mexico. *graminifolia*
 staminal cup 1.6 cm. long ; leaves 10–15 cm. long, 4 mm. wide ;
 perigone-tube 3–3.5 cm. long, segments 5 cm. long. Florida. *humilis*.
- (27) perigone-tube 3–5 cm. long (28)
 perigone-tube 7–20 cm. long (29)
- (28) leaves narrow oblong-ensiform, 23–30–(42) cm. long, 2.5–3.7–
 (4.5) cm. wide. Mexico. *dillenii*
 leaves linear, 10–15 cm. long, 4 mm. wide. Florida. *humilis*
- (29) leaves oblanceolate or suboblong, long tapered to the base, 27–
 30 cm. long, 2.5–5.1 cm. wide (30)
 leaves linear to lorate in the upper part and then narrowed down-
 wards, if more than 2 cm. wide then 40–120 cm. long . . . (31)
- (30) staminal cup 1.3–1.5–(1.8) cm. long. Mexico. *harrisiana*
 staminal cup 2.5 cm. long. Mexico. *horsmanni*
- (31) staminal cup 3.5–5 cm. long, filaments 2.5–3 cm. long. N.
 America. *rotata*
 staminal cup 2–2.5 cm. long, if 3–3.5 cm. then filaments 4–6 cm.
 long (32)
- (32) leaves linear, 18–30 cm. long, 6–12 mm. wide, ovules 2 (rarely 3)
 in each cell (33)
 leaves lorate, 30–120 cm. long, (7)–12–38 mm. wide ; ovules
 4–8 in each cell (34)
- (33) flowers 1 ; leaves up to 30 cm. long, 6 mm. wide. Florida. *palmeri*
 flowers 3–4 ; leaves 18–30 (or more) cm. long, 6–12 mm. wide.
 Mexico. *sonorensis*
- (34) staminal cup apparently funnel-shaped with the margins suberect,
 2–2.5 cm. long ; filaments 3–3.5 cm. long ; leaves 25–40 cm. long,
 (0.7)–1.3–2.8 cm. wide ; perigone-tube 7–11 cm. long, segments
 6.5–9 cm. long. Cuba. *praticola*
 staminal cup funnel-form with the margins wide-spreading or
 rotate, 2–3.5 cm. long ; filaments 4–6 cm. long (35)

- (35) leaves 30–60 cm. long, 1.4–2 cm. wide ; perigone-tube 8.5–12 cm. long, segments 8.5–11 cm. long. Mexico. *acutifolia*
 leaves 35–120 cm. long, (2)–3–3.8 cm. wide ; perigone-tube 14–20 cm. long but sometimes (10)–11.5–13 cm. long, segments 7.5–12 cm. long. Colombia, ? Mexico. *littoralis*

ENUMERATION OF SPECIES

- (1) **H. tubiflora** Salisb. in Trans. Hort. Soc. **1**, 341 (1812) ; Roemer, Syn. Monogr. **4**, 169 (1847) ; Baker, Handb. Amaryll. 121 (1888).

Syn. *Pancratium undulatum* H.B.K. Nov. Gen. & Sp. **1**, 280 (1815) ; Ker, Gen. *Pancratium* 10 (in Quart. Journ. Sc. & Arts, **3**, 325) (1817).

Pancratium guianense [Ker] in Bot. Reg. t. 265 (1818) ; Seubert in Mart. Fl. Bras. **3**, i. 162 (1871).

Hymenocallis undulata (H.B.K.) Herbert, App. 44 (1821) ; Roemer, l.c. **4**, 169 (1847) ; Rev. Hort. 1869, p. 418, cum fig. ; Garden, **6**, 197, cum fig. (1874) ; Baker, l.c. 121 (1888) ; Bellair & St. Leger, Pl. Serre, 934, cum fig. (1900).

Hymenocallis guianensis (Ker) Herbert, App. 44 (1821) ; Roemer, l.c. **4**, 168 (1847) ; Kunth, Enum. Pl. **5**, 667 (1850).

Pancratium tubiflorum (Salisb.) Schultes, Linn. Syst. Veg. **7**, 926 (1830).

Pancratium petiolatum Willd. ex Schultes, l.c. **7**, 912 (1830).

Hymenocallis guianensis var. *tubiflora* (Salisb.) Herbert, Amaryll. 210 (1837).

Hymenocallis guianensis var. *undulata* (H.B.K.) Herbert, ibid. (1837).

Hymenocallis guianensis var. *princeps* Herbert, ibid. (1837).

Hymenocallis borskiana De Vriese in Nederl. Kruidk. Arch. **1**, 156 (1846) et Epimeton Ind. Sem. 1846 Pl. Nov. Hort. Bot. Acad. Lugd. Bat. Cult. 3 (1847) et Descr. & Fig. Pl. Nouv. & Rar. **1**, t. [10] (1847) ; Kunth, Enum. **5**, 854 (1850) errore *H. boschiana*.

Hymenocallis petiolata (Willd.) Roemer, l.c. **4**, 168 (1847) ; Kunth, l.c. **5**, 672 (1850).

Hymenocallis moritziana Kunth, Enum. **5**, 668 (1850) ; Karsten, Fl. Columb. **1**, t. 40 (1858–61) ; Baker, l.c. 121 (1888) ; Gard. Chron. ser. 3, **27**, 89 (1900).

Leaves 7–12, petiolate ; *blades* elliptic or broad elliptic or lanceolate-elliptic or ovate-elliptic or ovate, shortly acuminate or cuspidate, cuneate to almost rounded at the base, 22–37.5 cm. long, 7.3–15 cm. wide, veins widely spaced ; *petioles* 15–30 cm. long. *Scapes* to 60 cm. long, 5–10-flowered (to 20-flowered in cultivation). *Perigone : tube* 12.5–20 cm. long, *segments* 8.5–13.5 cm. long. *Staminal cup* funnel-form, margins erect or only slightly spreading, 1.8–2 cm. high ; *filaments* 4–6.5 cm. long. *Ovary* with 4–5 ovules in each cell.

VENEZUELA : Tovar, Fendler 1504 ; Caracas, comm. Sander & Co. May 1888.

BRITISH GUIANA : Potaro River, *Jenman* 950 ; Maosaroonie, Essequebo, and Cuyounil, *Appun* 241 ; Ekereku River, Cuyuni River, *Davenfort* 5 ; sine loc. *Drake* ; Mazaruni Station, *Forestry Dept. Brit. Guiana M.* 204 ; Corentyne River, *Jenman* 26 ; *ibid. Im Thurn* ; Demerara, cult., *Parker*.

FRENCH GUIANA : Cayenne, *Martin* 156 (BM) et sine num. (BM).

DUTCH GUIANA : Surinam, *Berthoud-Coulon* 71 (BM), 72 (BM).

BRAZIL : sine loc. *Burchell* 9744.

TRINIDAD : sine loc. *Fendler* 812 (BM, K) ; Aripo Road, *Broadway* 9187 (BM).

CULT. : Hope Gardens, Jamaica, *Harris* 156 ; Botanic Station, Tobago, *Broadway* 4242 ; in hort. *Sander & Co.* (orig. Demerara) ; in hort. *Charlesworth* (orig. S. America) ; in Hort. Kew. (BM) ; in Hort. Kew. 20 June 1807 (Hb. Smith).

There is no question about the identity of Salisbury's *H. tubiflora* for he says it is a Guiana plant grown at Kew from a bulb taken from a captured French ship in 1803, and there is a specimen of that plant in the British Museum herbarium. There may, however, be some doubt as to whether the information about the species given by Salisbury is sufficient to validate the name. He says that the leaves are so pointed as to be almost cuspidate, that the perigone-tube is exceedingly long, and that the staminal cup is very short. There are three species with "exceedingly long" perigone-tubes, *H. littoralis*, *H. pedalis*, and *H. tubiflora*, but of these only the last can be said to have leaves anything like cuspidate and its staminal cup is the smallest. Incidentally, since Salisbury dealt with *H. littoralis* in the article cited above, that species could reasonably be left out of consideration.

(2) ***H. cordifolia*** Micheli in *Rev. Hort.* 1899, p. 444, fig. 191.

Plant including the inflorescence about 90 cm. high above ground ; bulb, which is mostly above ground, passing upwards into a stout stem about 13 cm. long and 2.8 cm. in diameter formed by the sheathing bases of the old leaves, at the top of this stem arise 4 petiolate leaves and the inflorescence. *Bulb* about 8 cm. in diameter. *Leaves* : *blades* ovate, short acuminate, cordate at base, 29-36 cm. long, 14-14.8 cm. wide, bright green, the midrib broad paler and more yellowish ; *petioles* 10-14 cm. long, channelled. *Scape* 42 cm. long above the false stem ; *spathe-valves* narrow triangular, about 6 cm. long, deflexed at anthesis ; *bracts* linear, 3.5-6 cm. long, deflexed ; *flowers* 12, pedicellate, spreading-ascending ; *pedicels* about 1 cm. long, deep green. *Perigone* : *tube* 9.5-11 cm. long, green at base becoming white upwards ; *segments* 7.5-8 cm. long, 5-6 mm. wide, spreading decurved, white. *Staminal cup* white, funnel-shaped, about 2 (-2.5 ?) cm. long, 2 cm. wide, with a single wide tooth between the filaments ; *filaments* 3.3-4 cm. long, green ; *anthers* about 1.5 cm. long, orange. *Style* overtopping the anthers by 1.5-2 cm. *Ovary* about 1.5 cm. long, deep green, with 1 ovule in each cell *fide* Micheli.

MEXICO : Rio Detatlan, State of Guerrero, 500 m. alt., *fide* Micheli.

The above description was made from a drawing at Kew of a plant which flowered in the Gardens on 13 May, 1901, the bulb having been

sent by Micheli in 1899. I have not seen a specimen of the species. It is outstanding by the ovate cordate leaf-blades and by the well-developed false stem. The leaves of most, if not all, species of *Hymenocallis* sheathe one another at the base and form a short or very short thick "stem" just above the bulb. If the top of the bulb is above ground the stem is evident, but when the bulb is well-buried the stem is hidden. In *H. cordifolia* the bulb seems to be mostly above ground, and the false stem is very long. The Kew plant had four leaves, and Micheli says this number is constant for the species.

(3) **H. ovata** (Mill.) Sweet, Hort. Brit. ed. 2, p. 513 (1830) ; Roemer, Syn. Monogr. **4**, 169 (1847) ; Baker, Handb. Amaryll. 122 (1888) excl. syn. *P. fragrans*.

Syn. *Pancratium ovatum* Miller, Abridgem. Gard. Dict. ed. 6, no. 9 (1771) ; Bot. Reg. t. 43 (1815) ; Ker, Genus *Pancratium*, 15 (in Quart. Journ. Sc. & Arts **3**, 330) (1817).

Pancratium amoenum Salisb. sec. Gawler in Bot. Mag. t. 1467 (1812) non Salisbury ; Ker, Genus *Pancratium*, 14 (in Quart. Journ. Sc. & Arts, **3**, 329) (1817) quoad descr. et Bot. Mag. t. 1467 ; Loddiges, Bot. Cab. **3**, t. 286 (1818).

Hymenocallis amoena (Salisb. sec. Gawl.) Herbert, App. 44 (1821) ; Roemer, l.c. (1847) ; Kunth, Enum. Pl. **5**, 669 (1850).

Hymenocallis amoena var. *ovata* (Mill.) Herbert, App. 44 (1821) et Amaryll. 211 (1837).

Hymenocallis amoena var. *princeps* Herbert, Amaryll. 211 (1837).

Pancratium foliis amplis ovatis . . . etc. Trew, Pl. Sel. Ehret, Dec. 3, p. 6, t. 28 (1752).

Pancratium foliis ovatis nervosis Miller, Gard. Dict. ed. 7, no. 9 (1759).

Leaves 5-8, petiolate ; *blades* broad elliptic, acute, cuneate at the base and tapering into the broad petiole, 20-28 cm. long, 8.5-11 cm. wide ; *petioles* 5.5-13 cm. long. *Scape* 30-45 cm. long ; *flowers* 5-6, sessile ? *Perigone* : *tube* (3)-4.5-5 cm. long, green, stout ; *segments* white, spreading-recurved, 5.5-6.5 cm. to 9-10 cm. long, 5-7 mm. wide. *Staminal cup* funnel-shaped, about 2.5 cm. high, 2 cm. or less wide, white, toothed or entire between the filaments ; *filaments* green, 3.5-4 cm. long ; *anthers* orange, about 1.5 cm. long.

WEST INDIES ?

Known to me solely from the literature, and chiefly from the illustrations cited above. The species first became known from the account and figure published by Trew (l.c.). Miller had it in the seventh edition of his Gardeners Dictionary (1759), but not in the eighth edition (1768), in which he first used the Linnean binomial system of nomenclature. *Pancratium amoenum* Salisb., with which it was misidentified, is *H. caribaea* (L. emend. Gawl.) Herb.

Closely related to *H. ovata*, and perhaps only a variety of it, is the plant figured and described in Loddiges, Botanical Cabinet, t. 510 (1821), as *P. ovatum*, but which Herbert (Amaryll. 212 : 1837) segregated as a

distinct species, *Hymenocallis ovalifolia* Herb. It seems to have been a smaller plant, with smaller leaves (blades about 10.5 cm. long and 4 cm. wide) and flowers with a larger perigone-tube (about 7 cm. long). Like *H. ovata*, it is said to have been imported from the West Indies.

Even more closely related to *H. ovata* and perhaps conspecific with it are *Hymenocallis ornata* (Bouché) Roemer (Syn. Monogr. **4**, 166 : 1847 ; Kunth, Enum. Pl. **5**, 665 : 1850 ; syn. *Pancratium ornatum* C. Bouché in Linnaea, **13**, 79 : 1839) whose native country was unknown, and *Hymenocallis skinneriana* Herbert in Bot. Reg. 1843, Misc. p. 45, named after a Mr. Skinner who found the bulbs "in a part of Guatemala little visited". Judging from the descriptions these two species do not differ from one another, and can be separated from *H. ovata* only by the flowers having a longer perigone-tube (5-7.5 cm. long) and slightly shorter filaments (c. 3 cm. long).

(4) **H. schizostephana** Worsley in Gard. Chron. ser. 3, **25**, 386 (1899) ; J. D. Hooker in Bot. Mag. t. 7762 (1901).

Leaves 6-8, of which about 5 represent new growth of the year and the rest persistent leaves of the previous season, distichous, petiolate ; *blades* oblong-elliptic, acute, cuneate at base, 25-31 cm. long, 6.7-8.7 cm. wide ; *petioles* 5-10 cm. long. *Scape* about 30 cm. long, compressed but not ancipitous (fide Hooker) ; *flowers* 10-20, sessile. *Perigone* : *tube* about 5.5 cm. long, *segments* about 7 cm. long. *Staminal cup* vase-shaped, about 1.5 cm. high, more or less deeply split between the filaments, which thus appear to be broadly winged at the base ; *filaments* 3.5-4 cm. long. *Ovary* with 2 ovules in each cell.

BRAZIL ?

CULT. in Hort. Bot. Reg. Kew. June 16, 1899.

Described from cultivated plants, believed to be of Brazilian origin, and still known only from the original importation. It is easily recognised by the staminal cup.

(5) **H. speciosa** (Salisb.) Salisb. in Trans. Hort. Soc. **1**, 340 (1812) excl. Redouté, Lil. t. 156 ; Herbert, App. 43 (1821) et Amaryll. 209 (1837) pro parte ; Roemer, Syn. Monogr. **4**, 167 (1847) ; Kunth, Enum. Pl. **5**, 664 (1850) pro parte ; Baker, Handb. Amaryll. 122 (1888).

Syn. *Pancratium speciosum* Salisbury in Trans. Linn. Soc. London, **2**, 73, t. 12 (1794) ; Willd. L. Sp. Pl. **2**, 44 (1799) ; Ker in Bot. Mag. t. 1453 (1812) ; Redouté, Lil. **7**, t. 512 (1813) ; Ker, Genus Pancratium, 16 (in Quart. Journ. Sc. Arts, **3**, 331) (1817) ; Bury, Hexandr. Pl. t. 47 (1831-4) ?

Leaves evergreen, several, rosulate, the 7-9 new leaves of the current year well-developed at flowering time, arising in the middle of the leaves of the previous season, distinctly petiolate, very variable in size, 38-60 cm. long (77-95.5 cm. long in some cultivated plants) ; *blades* broad elliptic or broad oblong-elliptic, shortly acute, cuneate at base, 26-46 cm. long and 8-13.3 cm. wide but 57-65.5 cm. long and 10.5-15.5 cm. wide in some cultivated plants ; *petioles* broad, 9-17 cm. long. *Scape* 30-40 cm. long, glaucous, ancipitous ; *flowers* 7-12, wide-spreading,

pedicellate ; *pedicels* to 1 cm. long. *Perigone* : *tube* (6.5)–7–9 cm. long ; *segments* (9)–9.5–11.5 cm. long, sometimes 12.5–15 cm. in larger cultivated plants. *Staminal cup* funnel-shaped (2.2)–2.5–3.5 cm. long (4–5 cm. in larger cultivated plants), toothed between the filaments ; *filaments* almost erect, 3.4–5—(5) cm. long. *Ovary* with 2 ovules in each cell.

WEST INDIES : St. Vincent, *H. H. & G. W. Smith* 385.

CULT. in Hort. Bot. Reg. Kew. 2 Oct. 1894, 15 April 1930 ; in hort. Harland. ; in Hort. [Kew. ?] anno 1782 (BM).

The habitat for the only West Indian specimen seen was given as “damp places, open ground, hillsides, or near streams, from 1000 ft. to near sea-level.” This is one of the three species with pedicellate flowers, the others being *H. cordifolia*, which is quite different, and *H. fragrans* which is very nearly related to *H. speciosa*.

(6) **H. fragrans** (Salisb.) Salisb. in Trans. Hort. Soc. **1**, 340 (1812), excl. Trew, Sel. t. 28 ; Roemer, Syn. Monogr. **4**, 167 (1847).

Syn. *Pancratium fragrans* Salisbury in Trans. Linn. Soc. London, **2**, 72, t. 11 (1794) ; Willd. L. Sp. Pl. **2**, 43 (1799) excl. Trew, Sel. t. 28 ; Redouté, Lil. **7**, t. 413 (1813) ; Loddiges, Bot. Cab. **9**, t. 834 (1824).

Pancratium recurvum Stokes, Bot. Nat. Med. **2**, 214 (1812), pro parte, nom. illegit.

Hymenocallis speciosa var. *fragrans* (Salisb.) Herbert, Amaryll. 209 (1837) ; Kunth, Enum. Pl. **5**, 665 (1850).

Hymenocallis sloanei Roemer, l.c. 171 (1847), pro parte, excl. ref. Sloan.

Narcissus totus albus latifolius . . . Sloane sec. Martyn, Hist. Pl. Rar. 27, cum tab. (post 1730), non Sloane.

Leaves 7–10 fide Salisbury, about 40 cm. long, shortly and broadly petiolate ; *blades* elliptic or oblong-elliptic, acute, cuneate at base, 32–33 cm. long, 6.3–8 cm. wide ; *petioles* 6–7 cm. long, about 2 cm. wide. *Scape* 40–45 cm. high (?) ; *flowers* 7–12, shortly and stoutly pedicellate ; *pedicels* to 5 mm. long. *Perigone* : *tube* 6–8 cm. long ; *segments* 8–10 cm. long. *Staminal cup* funnel-shaped, 2–2.5 cm. or 2.7–3 cm. high, margins erect and entire ; *filaments* 3.5–4.5 cm. long. *Ovary* with 2 ovules in each cell.

WEST INDIES : Barbados, common amongst hills near coast, *J. F. Waby* 109.

CULT. : in hort. Veitch, July 1885 (orig. Barbados) ; in hort. Pam. 19.xii.1939.

Distinguished from *H. speciosa* primarily by its shorter, narrower leaves with shorter petioles, and perhaps, as Herbert suggested, no more than a variety of that species. The two are very similar in floral characters, including the pedicellate flowers. Salisbury originally described *H. fragrans* from plants received from Barbados, and the solitary specimen seen from that island is a good match of his figure and description, as is the specimen of the plant cultivated by Messrs. Veitch which was also imported from Barbados. The plant illustrated by Martyn was grown

at Chelsea and likewise came from Barbados ; it has been confused with *H. caribaea*, but the dimensions of the flower and the description of the ovary as " Ovarium namque triangulare pediculis singulis insidet " point to *H. fragrans*. Willdenow's citation for this species of Trew, Pl. Sel. Ehret, Dec. 3, t. 28 (1752), and its acceptance by Salisbury, led to *H. fragrans* being confused with *H. ovata*, for the Trew plate represents the latter species. It was this, no doubt, that led Baker to reduce *H. fragrans* to *H. ovata* in his Handbook of the Amaryllideae, 122 (1888).

(7) **H. eucharidifolia** Baker in Gard. Chron. N. Ser. **21**, 700 (1884); et Handb. Amaryll. 122 (1888).

Leaves 4 and sessile *fide* Baker, broad oblong-elliptic, shortly acuminate, cuneate at base, 26–30 cm. long, 7.5 (*fide* Baker)–9 cm. wide, the single leaf seen has the blade passing into a short 4 cm. long petiole-like base which is perhaps part of the sheath, thin, bright green, veins clearly visible and well-separated. *Scape* about 30 cm. high ; *flowers* 4–5, sessile. *Perigone* : *tube* about 10 cm. long ; *segments* 6.5–7.5 cm. (–8.7 cm. *fide* Baker) long. *Staminal cup* funnel-form, 2.7–2.8–(3) cm. high, about 2.5 cm. wide, margins erect with two minute teeth close together midway between one filament and the next ; *filaments* 2.5–3 cm. long. *Ovary* with 2 ovules in each cell.

CULT. in Hort. Bot. Reg. Kew. 24 May 1884.

Described originally from a plant, of unknown origin, which flowered at Kew in May 1884, and known to me from the type-material only, namely a single leaf and a scape with 1 flower and 3 ovaries. Apart from the absence of a petiole, the leaf strongly resembles some leaves of *H. tubiflora*, and, as in that species, the perigone-segments are markedly shorter than the tube. Both tube and segments are shorter than in *H. tubiflora*, as are the filaments, while the staminal cup is larger and leaves and flowers are fewer. *H. eucharidifolia* differs from *H. speciosa* and *H. fragrans* in the leaves being thinner, as well as epetiolate, by the perigone-tube being longer, the segments much shorter and narrower, and the tube longer, not shorter, than the segments. So far as number, size, and shape of the leaves is concerned, and their being sessile, *H. eucharidifolia* is nearest to *H. choretis*, but this, as will be seen from the description below, has a bigger perigone, and the staminal cup more or less rotate instead of funnel-form.

(8) **H. choretis** Hemsley, Biol. Centr.-Amer. Bot. **3**, 335 (1884) Syn. *Choretis glauca* Herbert, Amaryll. 220, t. 35, fig. 1, t. 41, fig. 32, 33, t. 44, fig. 45 (1837) ; Kunth, Enum. Pl. **5**, 681 (1850).

Hymenocallis glauca (Herb.) Baker ex Benth. & Hook. f., Gen. Pl. **3**, 734 (1883) *non* *H. glauca* (Zucc.) Roem.

Leaves 3 or 4, erect, epetiolate, broad elliptic or elliptic-lorate, obtuse, 30–45 cm. long, 6.2–(7.2–8) cm. wide, glaucous (or glaucescent). *Scape* (30) 35 cm. high ; *spathes* erect, narrow (scarcely 4)–5 cm. long ; *flowers* (2) 3 or 4, sessile. *Perigone* : *tube* (14)–15 cm. long or more ; *segments* (7–7.5)–9 cm. long, 6–7 mm. wide (outer 7 mm., inner 11 mm. wide). *Staminal cup* rotate from a short tubulose base, (2.7)–3 cm. long ; *filaments* 2.5–2.8 (3.3–3.5) cm. long. *Ovary* with 2, sometimes 3, ovules in each cell.

MEXICO : Acaponeta, Tepic Terr., *Rose* 1502 [?] ; Campo Morado, *Langlassé* 1060 [?].

CULT. : in Hort. Paris. 9 June 1860 (ex herb. J. Gay).

No material has been seen that agrees exactly with Herbert's description and figures, but the specimen from J. Gay's herbarium, cited above, is not very different, and may well represent Herbert's species. This specimen comprises a leaf and a flower from a plant of unknown origin which flowered in the Jardin des Plantes, Paris, in June 1860, and there is a long and detailed description of it in volume 28 of J. Gay's MSS. at Kew. The description above is based primarily on Herbert's account, the dimensions (etc.) in brackets being added from Gay's specimen where it does not conform with Herbert's account. Herbert's plant apparently originated from Mexico ; the two Mexican specimens enumerated above agree in leaf, but unfortunately the flowers are too poor to allow certain identification. Herbert regarded this species and *H. galvestonensis* as constituting a distinct genus, which he named *Choretis*, and which he distinguished from *Hymenocallis* by the larger connective, the seeds intermediate between those of that genus and *Ismene*, and by the scape being round instead of ancipitous. The characters, even if constant, are scarcely of generic value and *Choretis* has long been reduced to *Hymenocallis*.

The figure in Knowles & Westcott, *Floral Cabinet*, 2, 101, t. 71 (1838), which purports to be Herbert's *Choretis glauca*, differs greatly by its shorter, broader, clearly petiolate leaves and shorter perigone-tube. Much of the text is taken from Herbert's account and the authors noted that their plant differed "in some respects from Mr. Herbert's description . . ." The explanation of the discrepancies eludes me. Incidentally the plate of *Choretis glauca* in Mrs. Loudon's *Ladies Flower Garden of Ornamental Bulbous Plants*, t. 32 (1841), is an adaption of Knowles & Westcott's—without acknowledgement.

Baker, *Handbook of the Amaryllideae*, 123 (1888) referred *H. choretis* to *H. glauca* (Zucc.) Roemer, *Syn. Monogr.* 4, 173 (1847), a species originally described by Zuccarini (in *Abh. Akad. Muench.* 2, 317 : 1837) as *Pancratium glaucum*. It agrees fairly well with Herbert's species in vegetative characters, but differs sharply by its much smaller flowers—the perigone-tube only 5 cm. long with the segments subequal to it—though the staminal cup is described as rotate, which conforms with Herbert's plant. It is possible that *H. glauca* (Zucc.) Roem. may be an unusually small-flowered example of *H. choretis*, but further information is needed before the point can be decided.

(9) ***H. horsmanni*** Baker, *Handb. Amaryll.* 125 (1888).

Leaves few, 26–30 cm. long, oblanceolate, bluntly acute or bluntly and widely cuspidate, long tapered downwards, the broad lamina about 20 cm. long and 2.5–4 cm. wide passing gradually into a narrow petiolar part 7 cm. long, which apparently sheathes the scape. *Scape* very short (always ?), 7–11 cm. long ; *spathes* several, about 3 cm. long ; *flowers* 1–4, sessile. *Perigone* : tube 11.5–14 cm. long, segments 8 cm. long, narrow. *Staminal cup* apparently rotate above a short tubulose base, in all about 2.5 cm. long, 3.7 cm. in diameter ; *filaments* 3 cm. long. *Ovary* with 2 ovules in each cell.

CULT. : in horto Horsman. & Co., July 1883 (orig. Mexico).

Still known only from the type-material taken from plants grown by Messrs. Horsman & Co. of Colchester, and said to have originated from Mexico. In its few leaves and flowers, and in the size and general appearance of the flowers, *H. horsmanni* recalls *H. choretis*, but it differs by its narrower oblanceolate leaf, short scape, and narrow segments. It is obviously related to the next species, *H. harrisiana*, but that has a much smaller staminal cup, only 1.3–1.5 cm. long and 2 cm. wide. There is no information as to whether the leaves of *S. horsmanni* are evergreen or deciduous, but the species seems so obviously related to *S. harrisiana* and *S. dillenii* that it most likely agrees with them in the leaves being deciduous. Here may belong a specimen cultivated by H. J. Elwes which was in flower on 1 September 1913. The perigone-tube is (6 ?)–8.5 cm. long, segments 7.5–9.5 cm. long, staminal cup 2.2–2.4 cm. high, and filaments 3.2–4.2 cm. long. It thus differs chiefly by its shorter tube and longer filaments.

(10) **H. harrisiana** Herbert in Bot. Reg. 1840, Misc. p. 35 ; Kunth, Enum. Pl. 5, 672 (1850) ; Bot. Mag. t. 6562 (1881) ; Baker, Handb. Amaryll. 124 (1850).

Leaves 3–5, 20–34 cm. long, oblanceolate or suboblong, apex obtuse and apiculate or narrowed and acute, the broad lamina 19–27 cm. long and 3–5.1 cm. wide tapered into a usually narrow petiolar part about 7 cm. long, which apparently sheathes the scape. Scape 20–23 cm. long ; flowers 1.3–(6). Perigone : tube 10–13 cm. long, segments 6–7.5 cm. long. Staminal cup funnel-shaped with margins spreading, 1.3–1.5–(1.8) cm. long, 1.5–1.8 cm. in diameter ; filaments 2.5–3.5 cm. long. Ovary with 2 ovules in each cell.

MEXICO : Temascaltepec Distr., La Labor, Hinton 897 (BM, K) and 4248 (BM, K), Tejupilco, Hinton 953 and 4178 ; State of Morelos, Cuernavaca, Pringle 6350 (BM).

CULT. : Saunders, May 1869 ; Trevor Clarke, April 1878 and May 1879 ; Ware (orig. State of Michoacan) May 1884 ; Bull, July 1884 ; Kew, May 1887.

Originally described from plants imported by a Mr. T. Harris, but no specimen of this introduction has been seen. The species is allied to *H. horsmanni*, which differs by its larger staminal cup, and to *H. dillenii* which has a much shorter perigone-tube (4–5 cm. long) which is shorter than the 5.5–6 cm. long segments, whereas in *H. harrisiana* the 10–13 cm. long tube much exceeds the 6–7.5 cm. long segments. There are, however, two specimens at Kew, both from plants grown in the Gardens, in 1879 and 1894, which agree well with *H. harrisiana* except that the tube is shorter, 6–7.5 cm. long instead of 10–13 cm. The inclusion of these two specimens in *H. harrisiana* somewhat reduces the distinctiveness of the species from *H. dillenii*.

(11) **H. dillenii** Roemer, Syn. Monogr. 4, 174 (1874).

Syn. *Pancratium mexicanum* L. Sp. Pl. 1, 290 (1753) ; Willd. L. Sp. Pl. 2, 42 (1799) ; Aiton, Hort. Kew. 1, 410 (1789).

Pancratium caribaeum Miller, Gard. Dict. ed. 8, no. 4 (1768).

Hymenocallis ? *milleri* Roemer, Syn. Monogr. **4**, 177 (1847).

Hymenocallis concinna Baker in Gard. Chron. ser. 3, **14**, 150 (1893) ; Worsley, *ibid.* **32**, 30 (1902).

Hymenocallis pringlei Greenman in Proc. Amer. Acad. **39**, 74 (1904).

Hymenocallis mexicana (L.) Herb. ex Druce, Dillenian Herbaria, 176 (1907), non *H. mexicana* Herb. (1821).

Pancratium mexicanum, flore gemello, candido Dillenius, Hort. Eltham. 299, t. 222 fig. 289 (1732).

Leaves 4, deciduous, narrow oblong-elliptic or oblong-ensiform, acute, tapering to a petiole-like base which sheathes the scape within the neck of the bulb, 23–30 cm. long and 2–3.7 cm. wide but to 4.6 cm. wide in cultivation. *Scape* 20–30 cm. long ; *spathes* 4–5.5 cm. long ; *flowers* 2–6 (–8 in cultivation), sessile. *Perigone* : tube 3.5–5 cm. long, segments 5.5–6.7 cm. long, 4–5 mm. wide, spreading-recurved. *Staminal cup* funnel-form, 1.5–2 cm. high, 1.8–2 cm. in diameter ; *filaments* 2–2.5 (–3) cm. long. *Ovary* with 2 ovules in each cell.

MEXICO : Hidalgo, near Tula, *Pringle* 6371 (type-no. of *H. pringlei* ; BM, K) ; Michoacan, near Morella, *Arsène* 2626 (BM, K, pro parte ?).

CULT. in Hort. Bot. Reg. Kew. July 1863, 3 July 1906 (?) ; in hort. Bull. Nov. 1873 ; in hort. Dammann. June 1893 (type of *H. concinna*).

This species was well described and figured by Dillenius in 1732 from a plant grown in James Sherard's garden at Eltham, the bulb of which had been collected in Mexico. With it Linnaeus identified plants grown in Georg Clifford's "incomparable" garden at Hartecamp (between Leyden and Haarlem) and also a plant grown in the Academy garden at Leyden, and for these plants he eventually proposed the name *Pancratium mexicanum*. So far as is known there is no specimen extant of any of these plants. Druce (l.c.) failed to find a Dillenian specimen, and Dr. E. F. Warburg, who has recently very kindly made a special search in the Dillenian, Sheradian, and Fielding herbaria at Oxford, confirms that no specimen exists. There is likewise no specimen of this species in the Clifford Herbarium, now at the British Museum (Natural History), nor in the Linnean Herbarium. The type of the name *Pancratium mexicanum* L. is, therefore, Dillenius's figure and description, and from them it is clear that the species was small, with four oblanceolate or oblong-ensiform leaves about 23 cm. long and 2.5–3.7 cm. wide, and a 2-flowered inflorescence about 30 cm. high ; the perigone-tube was 4–5 cm. long, the segments 5.5–6 cm. long, and the staminal cup quite small, about 1.5 cm. high. In view of this it seems strange that the name *Pancratium mexicanum* was early (1788) applied to plants from the south-eastern United States with several linear or lorate leaves 30–70 cm. long and 1.5–3.6 cm. wide, scape 30–45 cm. long and 2–5-flowered, perigone-tube 7–9.5 cm. long, segments 7.5–9.5 cm. long, and staminal cup notably large and rotate, 3.5–5 cm. long. Though Gawler described this as a distinct species, *Pancratium rotatum*, in 1805 and pointed out that it was certainly not *P. mexicanum* of Linnaeus, the confusion long persisted and it was no doubt due to this that the true *P. mexicanum* was redescribed by Baker in 1893 as *Hymenocallis concinna* and by Greenman in 1904 as *H. pringlei*. The name *Pancratium mexicanum* L. was given to yet another

species by Lindley in 1825 (Bot. Reg. t. 940) but this was speedily corrected by Herbert who named the plant *Hymenocallis littoralis* var. *acutifolia*, though it would seem better regarded as a distinct species, *H. acutifolia* (Herb.) Sweet. In view of the confusion that has gathered round the name *Pancratium mexicanum*, it is perhaps just as well that the name *Hymenocallis mexicana* cannot be used for the Dillenian plant because it has already been used by Herbert, Appendix, 44 (1821), for the plant figured in the Botanical Magazine, t. 1082, which is *H. rotata*. There is nothing to suggest that *Hymenocallis mexicana* Herb. might be a new combination based on *Pancratium mexicanum* of Linnaeus (as it probably was) and it must be accepted as a new name. As such it invalidates the use of the same name for the Dillenian species, and thus we can take up the very appropriate name *Hymenocallis dillenii* for that plant.

Of the two collections from Mexico listed above, Pringle 6371 seems to me to agree extremely well with Dillenius's plant. The left-hand plant of Arsène 2626 has the lower part of 3 leaves which must have been 23–30 cm. long and 1.4–2 cm. wide, and though the flowers are very poor—just a tangled mess—they were evidently small. This plant, therefore, is referable to *H. dillenii*. The right-hand plant on the same sheet also has poorly dried small flowers which may well agree with those of *H. dillenii*, but the three leaves are linear, about 18 cm. long and 8–10 mm. wide. The question arises: can this be a narrow-leaved variant of *H. dillenii*?

Much resembling this Arsène plant is the Kew sheet of Pringle 4742, collected near Guadalajara, State of Jalisco, which has four linear leaves 29–32.5 cm. long and 5–9 mm. wide, and a 4-flowered inflorescence which agrees quite well with that of *H. dillenii*. The British Museum and Edinburgh sheets of the same collecting agree with the Kew sheet so far as the inflorescence is concerned, but the leaves (detached, no bulb) are notably broader, being 26.5–36 cm. long and 1.4–1.5 cm. wide, and, moreover, they taper to both ends as in *H. dillenii*. They thus connect the linear-leaved plants with the broader-leaved typical *H. dillenii*. Pringle 4742 was named *Hymenocallis galvestonensis* Baker, but that species has much longer perigone-tube and segments and a bigger staminal cup. Though the specimen was collected in the State of Jalisco, it does not agree with *H. jaliscensis* M. E. Jones, for that is said to have "many" linear leaves and the perigone-tube 7.5 cm. long. These linear-leaved plants collected by Arsène and Pringle invite comparison with other linear-leaved Mexican plants, i.e. *H. graminifolia* Greenman and *H. sonorensis* Standley. With *H. graminifolia* they agree in the short perigone-tube, but differ markedly in the much smaller staminal cup, as in their longer leaves and scapes. *H. sonorensis* agrees with the Arsène-Pringle plants in the small staminal cup, but has a much longer perigone-tube (9–10 cm. long) and longer segments (7–8 cm.). The Arsène-Pringle plants might conceivably be small-flowered examples of *H. sonorensis*, or, as already indicated, they could be narrow-leaved variants of *H. dillenii*. Here is a problem for investigation in the field.

(12) **H. caribaea** (L. emend. Gawl.) Herbert, Appendix, 44 (1821) et Amaryll. 212 (1837); Kunth, Enum. Pl. 5, 672 (1850); Baker, Handb. Amaryll. 125 (1888).

Syn. *Pancratium caribaeum* L. Sp. Pl. **1**, 291 (1753) ed. 2, **1**, 418 (1762) ed. 3, **1**, 418 (1763), quoad plant. Commelin. ; Dryander in Aiton, Hort. Kew. **1**, 411 (1789) quoad plant. descrip. ; Gawler in Bot. Mag. t. 826 (1805) quoad plant. fig. ; Willdenow, Hort. Berol. t. 73 (1806) ; Gawler in Bot. Mag. sub t. 1467 (1812) ; Ker (Gawler), Genus *Pancratium*, 13 (in Quart. Journ. Sc. & Arts, **3**, 328) (1817).

Pancratium declinatum Jacquin, Sel. Stirp. Amer. Hist. 99 (1763), et Hort. Vind. **3**, 10, t. 11 (1776), et Sel. Stirp. Amer. Hist. . . . Adj. Icon. Autor. Archetypa Pictis, 51, t. 102 [1780], et Amer. Gew. Linn. Ord. t. 109 (1786), et Sel. Stirp. Amer. Hist. ed. Manhem. 125 (1788) ; Redouté, Lil. **6**, t. 358 (1812) et **7**, t. 414 (1813) ; Loddiges, Bot. Cab. **6**, t. 558 (1821).

Pancratium amoenum Salisbury in Trans. Linn. Soc. London, **2**, 71, t. 10 (1794) ; Willdenow, L. Sp. Pl. **2**, 44 (1799) ; Andrews, Bot. Rep. t. 556 (1808) ; Smith in Rees, Cyclop. **26**, no. 12 (1819) ; Bury, Hexandr. Pl. t. 28 (1831-4).

Pancratium speciosum Salisb. sec. DC. in Redouté, Lil. **3**, t. 156 (1807) non Salisb.

Pancratium recurvum Stokes, Bot. Mat. Med. **2**, 214 (1812) pro parte, nom. illegit.

Hymenocallis sessilis Salisbury in Trans. Hort. Soc. **1**, 339 (1812), excl. ref. Ph. Mill. et Sloane.

Pancratium patens Delile in Redouté, Lil. **7**, sub t. 414 (1813) ; Ker (Gawler), Genus *Pancratium*, 14 (in Quart. Journ. Sc. & Arts, **3**, 329) (1817).

Pancratium angustum Ker (Gawler), l.c. 12 (**3**, 327) (1817), et in Bot. Reg. t. 221 (1817).

Hymenocallis patens (Delile) Herbert, Appendix, 44 (1821) ; Roemer, Syn. Monogr. **4**, 170 (1847).

Hymenocallis angusta (Ker) Herbert, Appendix, 44 (1821) et Amaryll. 214 (1837) ; Roemer, l.c. 172 (1847) ; Kunth, Enum. Pl. **5**, 674 (1850).

Hymenocallis declinata (Jacq.) Sweet, Hort. Brit. ed. 2, p. 513 (1830) ; Roemer, l.c. 171 (1847).

Hymenocallis caribaea var. *cinerascens* Herbert, Amaryll. 212 (1837).

Hymenocallis caribaea var. *patens* (Delile) Herbert, Amaryll. 212 (1837).

Hymenocallis cinerascens (Herb.) Roemer, Syn. Monogr. **4**, 171 (1847).

Hymenocallis formosa Roemer, Syn. Monogr. **4**, 171 (1847).

Pancratium obtusatum Grisebach in Linnaea, **21**, 277 (1848).

Hymenocallis obtusata (Griseb.) Grisebach ex Walp. Ann. **3**, 618 (1852-3).

Hymenocallis adnata Herb. sec. Flore des Serres, ser. 2, **12**, t. 2275-6 (1876) non Herb.

Narcissus americanus flore multiplici albo hexagono odorato Commelinus, Horti Med. Amstel. Rar. Pl. Descr. Ic. **2**, 173, t. 87 (1701).

Leaves many, evergreen, broad ensiform or suboblong, tapered to the acute apex, or apex obtuse in var. *cinerascens*, slightly narrowed to the base, 30-60(-90) cm. long, 5-7.5-(10) cm. wide. *Scape* 30-60 (or more ?) cm. long; *flowers* 8-10 or more, sessile. *Perigone*: tube 4-6.5 cm. long, *segments* (8)-9-11-(12) cm. long. *Staminal cup* funnel-shaped, margins erect (not spreading), 2-3 cm. high; *filaments* 3-5 cm. long. *Ovary* with 2 ovules in each cell.

WEST INDIES: Antigua, Boggy Peak, Box 827 (BM); St. Cruz, Rohr (BM); Barbados, Moncrieffe St. John, *Gooding* 388 (BM); Martinique, Rivière Madame, *Hahn* 933; St. Eustatius, *J. J. Walsh*; Jamaica, *R. C. Alexander*, Malvern, *Wm. Harris* 9986, *W. Fawcett*; Ste. Lucia, coll. ? (BM).

CULT.: in hort. Herbert. (type of var. *cinerascens*); in Hort. Kew. (BM); [in hort. Vindob. ?] *Jacquin* (BM); in hort. Spring Grove anno 1784 (BM).

The name *Pancratium caribaeum* L. was validated by a diagnosis "spatha multiflora, foliis lanceolatis" taken from Linnaeus, Hortus Cliffortianus, 133 (1737), and by a number of references to literature. In the Hortus Cliffortianus Linnaeus was, of course, giving an account of the plants in Georg Clifford's garden at Hartecamp and of the specimens in Clifford's herbarium. The present species is included in the list of living plants (Viridarium Cliffortianum, 30: 1737), but there is no specimen of it in the Clifford Herbarium, now at the British Museum (Natural History).

In the Linnean Herbarium there is a sheet bearing the name *Pancratium caribaeum* with, in Gronovius's hand, the phrase-names used by Sloane and Tournefort and a reference to Martyn (see below). The small flowers mounted on the sheet, however, have nothing whatever to do with the genus *Pancratium* nor even with the family *Amaryllidaceae*; they belong, in fact, to the genus *Sansevieria* (*Liliaceae*), probably to *S. thyrsiflora* Thunb. It is inconceivable that either Gronovius or Linnaeus, ever thought these flowers belonged to *Pancratium*, and it is more likely that they were mounted on the sheet by mistake, the rightful flowers having been misplaced. The Linnean Herbarium reached this country in 1784, but the only reference to this specimen is that by Sir James E. Smith, mentioned below, whose remarks were quite inconclusive. This is strange in view of the fact that the application of the name *Pancratium caribaeum* L. was a vexed question from about 1790 until 1821. Presumably botanists either did not see the specimen, or disregarded it because it was so palpably misidentified.

The difficulty about the application of the name *Pancratium caribaeum* was due to the fact that the literature cited for it by Linnaeus, in his Hortus Cliffortianus and Species Plantarum (namely: Tournefort, Inst. Rei Herb. 358: 1700; Commelinus, Horti Med. Amstel. 2, 173, t. 87: 1701; Sloane, Cat. Pl. Jamaica, 115: 1694, et Voy. Is. Madera Jamaica, 240: 1707; Martyn, Hist. Pl. Rar. 27, cum tab.: post 1730) covers more than one species. What Tournefort's plant was I cannot say, but Commelyn's is the one here named *H. caribaea*, Sloane's is our *H. latifolia*, while Martyn's I would refer to *H. fragrans*. That Commelyn's and Sloane's plants were different must have been apparent very early, for the former has the perigone-tube 4-6.5 cm. long and much

shorter than the (8)–9–11–(12) cm. long segments, whereas Sloane described his plant as having the tube 15 cm. long and exceeding the 12.5 cm. long segments. Martyn's plant is very like Commelyn's in general appearance, and the fact that they represent different species was not appreciated. However, the Martyn plant has slightly larger flowers which are described as shortly pedicellate, and this would suggest that it is *H. fragrans* rather than *H. caribaea*, a suggestion which is strengthened by the fact that it came from Barbados, whence *H. fragrans* was obtained. Linnaeus's diagnosis of *Pancratium caribaeum* would apply equally to all the species mentioned, but would exclude the other species known by 1753, namely *H. caroliniana*, *H. ovata*, *H. littoralis* and *H. dillenii*. It may be pointed out that there is no evidence of Sloane's species being in cultivation before 1753, and that the plant in Clifford's garden for which Linnaeus proposed the name *Pancratium spatha multiflora, foliis lanceolatis* was more likely to have been Commelyn's or Martyn's. The account of *Pancratium caribaeum* in the second and third editions of Linnaeus' *Species Plantarum*, is exactly the same as that in the first edition.

Pancratium declinatum Jacq. (1763) is obviously the Commelyn plant, but Jacquin made no reference to *P. caribaeum*, nor to any of the pre-Linnean literature.

Miller, *Gardeners Dictionary*, ed. 8. no. 8 (1768) identified Sloane's plant with *Pancratium latifolium* Mill., but he did not refer to the other elements of *P. caribaeum* L. In fact, he used the epithet "Caribaeum" for another Linnean species, *P. mexicanum* L. (i.e. *Hymenocallis dillenii* Roem.) ; he cited the diagnosis and synonym given by Linnaeus for that species, and evidently used the epithet *caribaeum* instead of *mexicanum* by some mistake.

P. caribaeum is included in the first edition of Aiton's *Hortus Kewensis*, 1, 411 (1789) ; the diagnosis clearly indicates Commelyn's species, but the citation of "Sp. Pl. 418" (i.e. L. Sp. Pl. ed. 2) without comment would seem to indicate that Dryander, who was responsible for the botanical work in the book, was not then aware that the name *P. caribaeum* L. covered more than one species.

The plant figured and described by Salisbury in 1794 as *P. amoenum* is clearly conspecific with Commelyn's and with *P. declinatum* Jacq., as Salisbury himself indicated. He did not use Jacquin's name because he regarded it as inappropriate, and his own name *P. amoenum* is thoroughly illegitimate. The other elements of the Linnean *P. caribaeum*, i.e. the Sloane and Martyn plants, Salisbury thought might belong to one of his new species, namely *P. fragrans*, but he was not sure. In a note he indicated that these and the Commelyn plant together made up *P. caribaeum* L., but he did not use that name at all.

Willdenow, L. Sp. Pl. 2, 42 (1799) took up Salisbury's names *P. amoenum*, and *P. fragrans* but removed the Sloane and Martyn references from the latter and used for them the name *P. caribaeum* L. That Willdenow was not *au fait* with the plants is indicated by the fact that the Sloane and Martyn plants differ considerably, by his citation under *P. fragrans* of Trew, Pl. Sel. Ehret, Dec. 3, t. 28 (1752) which is a distinct species, *H. ovata*, and by the further fact that the very beautiful figure he

published in 1806 under the name *P. caribaeum* L. is the species for which in 1799 he used the name *P. amoenum*.

By the time of the publication of the second edition of Aiton's *Hortus Kewensis*, Dryander had become aware that the name *P. caribaeum* L. covered more than one species, and he did not use that name, but stated, 2, 219 (1811), that it was uncertain to which of the three species *P. amoenum* Salisb., *P. fragrans* Salisb., and *P. speciosum* Salisb., the name belonged.

Salisbury likewise did not take up the epithet *caribaea* when he established the genus *Hymenocallis* in 1812. Two elements of *P. caribaeum* L., namely the Commelyn and Sloane plants, he included along with *P. declinatum* Jacq. and his own *P. amoenum* under a new name *Hymenocallis sessilis*, proposed, characteristically, because he thought the trivial *sessilis* would be more appropriate than either of the two earlier epithets. The third element of the Linnean *P. caribaeum*, i.e. Martyn's plate, Salisbury placed under *H. speciosa* (Salisb.) Salisb.

However uncertain his contemporaries may have been regarding the application of the name *Pancratium caribaeum* L., Gawler had no doubt whatever that the species he had figured in the *Botanical Magazine*, t. 826 (1805) was the one which should rightfully bear that name, and in a note under t. 1467 (1812) he said so very firmly, adding "It has moreover the traditionary proof of having been known by that name in all our gardens from the days of its first institution as a Linnean species to the present". The plant shown in *Bot. Mag.* t. 826 is clearly Commelyn's species, and it was therefore to that element that Gawler restricted the name *P. caribaeum* L. He definitely excluded Sloane's plant, but he treated Martyn's as conspecific with Commelyn's. As already mentioned, Martyn's plant would seem better placed under *P. fragrans*, of which Gawler remarked "whether our plant is the *fragrans* of that gentleman [i.e. "Mr. Salisbury"], . . . we shall not pretend to decide."

Despite this forthright settlement of the question of the application of the name *P. caribaeum* L., J. E. Smith used that name in Rees, *Cyclopaedia*, 26, (1819) for Sloane's plant, stating: "*P. caribaeum* is a much-disputed species. Linnaeus adopted it from the above authors [i.e. Sloane, and Patrick Browne (whom Linné did *not* mention)] adding a reference to Commelin, which certainly belongs to what is now called *amoenum*, see n. 12. He had however an original specimen in his herbarium, sent by Gronovius, with the synonym of Sloane and Martyn; but this specimen consists merely of a few separate flowers, which appear to belong to *amoenum*, but can scarcely be ascertained. In this difficulty we leave the present species as we find it, the above synonyms of Sloane and Martyn not being with certainty referrible to any of the following, whatever may become of the specimen, which neither accords with them, nor could possibly have suggested the specific definition."

Finally, in 1821 William Herbert made the combination *Hymenocallis caribaea* and cited for it "*Bot. Mag.* 826", while in his "*Amarylloideae*" (1837) he circumscribed the species in such a way as to leave no doubt that he was applying the name to the plant figured by Gawler in *Bot. Mag.* t. 826, and that described by Jacquin as *P. declinata*, both of which are conspecific with Commelyn's plant. It is for this species that the name *H. caribaea* is used here.

(13) **H. expansa** (Herb.) Herbert, Appendix, 44 (1821) et Amaryll. 213 (1837) ; Roemer, Syn. Monogr. **4**, 172 (1847) ; Kunth, Enum. Pl. **5**, 674 (1850) ; Baker, Handb. Amaryll. 126 (1888).

Syn. *Pancratium expansum* Herbert in Bot. Mag. t. 1941 (1819).

Hymenocallis deleuillii Hort. ; Rev. Hort. 1894, p. 218.

A large vigorous plant with numerous evergreen leaves. *Leaves* broad oblong-ensiform or narrowly and obliquely oblong-elliptic or oblong-ob lanceolate, tapering to the acute apex and more gradually tapered to the lowest quarter which is distinctly narrower strongly channelled and thick, 40–77 cm. long, 3.8–7.5 cm. wide in upper part, 2.8–3 cm. wide in lowermost quarter. *Scape* 40–60–(80) cm. high ; *flowers* 10–20, sessile. *Perigone* : *tube* 8–10.6 cm. long ; *segments* 9–14.5 cm. long. *Staminal cup* narrowly funnel-shaped with margins erect, (2.5)–2.7–3.5 cm. high, somewhat tubulose in lowest third then widened upwards and 2.4 cm. wide at the mouth, somewhat fluted and with a large usually bifid tooth between the filaments ; *filaments* 4.5–6 cm. long. *Ovary* with 2, rarely 3, ovules in a cell.

WEST INDIES. Porto Rico : Adjuntas, *Sintenis* 4484 ; near Manati, *Sintenis* 6730 ; sine loc. *Heller* 257. Haiti : Bayeux near Port Margot, *Nash* 73. Santo Domingo : Jicomé, Distr. San José de las Matas, Prov. Santiago, *Valeur* 625, 993. Martinique : sine loc. *Hahn* 8779.

CULT. in horto Herbert. (type of *H. expansa*) ; in horto Deleuil. July 9, 1892 ; in Hort. Bot. Reg. Kew. July 1878, 5.vi.1930, 12.xi.1953 ; in horto Kingsmill. Dec. 1885 ; in horto Strickland. May 1892 ; in horto Gumbleton. May 22, 1894.

This member of the *caribaea* group differs from *H. caribaea* by the longer perigone-tube (8–10.6 cm. long against 4–6.5 cm.), though, as in that species the tube is shorter than the segments. It has more in common, however, with *H. latifolia*, the chief differences being that that species usually has a longer perigone-tube (mostly 11–15 cm. long against 8–10.6 cm.) which is longer than the 9–12.5–(14) cm. long segments. This might well be no more than variation within a single species, but more, and better material is needed before a decision can be reached. Information is particularly required on the degree of variation in populations of wild plants. It is possible that living plants of *H. expansa* may be so considerably different from those of *H. latifolia* that there would be no question about them ranking as distinct species, but that the differential characteristics disappear in the course of drying, the small differences shown by dried specimens being all that remain. The illustration of *H. expansa* cited above was obviously made from an inflorescence past its best.

Agreeing with *H. expansa* in length of perigone-tube (9–10 cm.) is a single specimen collected in Dominica by Dr. Imray (no. 463). It differs in having only three flowers in the inflorescence, in the perigone-segments being shorter (7–7.5 cm. long) as are the staminal cup (2.2–2.3 cm.) and filaments (3–3.3 cm.). It might rank as a poor example of *H. expansa* or *H. latifolia*—or even of *H. pedalis*—but better and more complete material is needed before the status of the plant can be assessed.

(14) **H. latifolia** (Mill.) Roemer, Syn. Monogr. **4**, 168 (1847).

Syn. *Pancratium caribaeum* L. Sp. Pl. **1**, 291 (1753), quoad plantam Sloanei ; Willd. L. Sp. Pl. **2**, 42 (1799) quoad plantam Sloanei.

Pancratium latifolium Miller, Gard. Dict. ed. 8, no. 8 (1768).

? *Hymenocallis crassifolia* Herbert, Appendix, 44 (1821) et Amaryll. 215 (1837) ; Roemer, Syn. Monogr. **4**, 173 (1847) ; Kunth, Enum. Pl. **5**, 677 (1850) errore *H. crassiflora* ; Small, Man. Southeastern Fl. 323 (1933).

Pancratium patens Red. sec. Lindley in Trans. Hort. Soc. London, **6**, 87 (1826), non Redouté.

Pancratium crassifolium (Herb.) Schultes, Linn. Syst. Veg. **7**, 921 (1830).

Hymenocallis caymanensis Herbert, Amaryll. 214 (1837) ; Roemer, Syn. Monogr. **4**, 173 (1847) ; Kunth, Enum. Pl. **5**, 675 (1850) ; Baker, Handb. Amaryll. 124 (1888).

Hymenocallis sloanei Roemer, Syn. Monogr. **4**, 171 (1847) quoad ref. Sloane.

Hymenocallis collieri Small, Man. Southeastern Fl. 322 (1933).

Hymenocallis keyensis Small, l.c. 322 (1933).

Hymenocallis kimballiae Small, l.c. 323 (1933).

Narcissus totus albus latifolius polyanthos . . . Sloane, Cat. Pl. Ins. Jamaica, 115 (1694) et Voy. Isl. Madera . . . Jamaica, 224 (1707).

Leaves numerous, evergreen, in the one plant seen tightly sheathing for 14 cm. above the top of the bulb and so forming a false stem 4.2–4.7 cm. in diameter which is covered for upwards of 9.5 cm. by the light grey-brown shining smooth remains of old leaves ; *free part* of leaves ascending-spreading, broad oblong or wide lorate in upper part, tapered to the acute apex or obtuse, gradually tapered below the middle to the narrower lorate lowermost quarter, 50–90 cm. long, (4.5)–5.5–10 cm. wide in upper part but only 2.5–4 cm. wide in lowermost quarter. *Scape* 60–80 cm. high ; *flowers* 6–10 or more (–16), sessile. *Perigone* : tube (10)–11–15 cm. long, exceeding the 9–12.5–(14) cm. long segments. *Staminal cup* funnel-shaped with the margins spreading, 2–3 cm. long ; *filaments* 4–6 cm. long. *Ovary* with 2 ovules in each cell.

FLORIDA : Sand ridges south of Cape Malabar, *Curtiss* 2830 (BM, K) ; Beach ridges near Cape Canaveral, *Curtiss* 5726.

WEST INDIES : Cuba, sine loc. *Wright* 3245. Jamaica, Robins Bay, *Orcutt* 4680 ; sine loc. *March* 1825 ; *Sloane* (Herb. IV. 112) (BM). Grand Cayman, East End, *W. Kings C.B.* 89 (BM) *G.C.* 114 (BM). Little Cayman, *W. Kings L.C.* 105 (BM).

CULT. : in horto Luzon, Philippines, *Merrill Sp. Blanco*. 128 (BM, K) ; in Hort. Bot. Hongkong. July 1875, *Herb. Hance*. 1335 (BM) ; in Hort. Bot. Reg. Kew. (orig. Hort. Bot. Hongkong.) June 30, 1953 ; in Hort. Bot. Cantab. June 1884 ; in horto *Herbert*. (type of *H. caymanensis* Herb.) ; in horto *Lady Hume*. (Hb. Smith).

This is the species collected by Sloane and described by him in his "Natural History of Jamaica" (Voyage to the Islands Madera Barbados

St. Nieves St. Christophers and Jamaica etc.). It was one of the plants included in *Pancratium caribaeum* by Linnaeus, an account of which has already been given. From *H. caribaea* it differs by the perigone-tube being more than twice as long and exceeding the segments. It is nearer to *H. expansa*, as explained in the note to that species. The species is generally known as *H. caymanensis*, but the oldest available name is *Pancratium latifolium* of Miller, whence the species takes the combination *H. latifolia*. I have not seen material of the species described by Small which are here reduced to *H. latifolia*, but there is nothing in his descriptions to suggest that his plants are distinct.

(15) **H. tenuiflora** Herbert, Appendix, 44 (1821) et Amaryll. 213 (1837) ; Roemer, Syn. Monogr. **4**, 172 (1847) ; Kunth, Enum. Pl. **5**, 674 (1850) ; Baker, Handb. Amaryll. 124 (1888).

Syn. *H. insignis* Kunth, Enum. Pl. **5**, 675 (1850).

Leaves many (13 fide Kunth), evergreen (?), recumbent according to Herbert, wide-spreading recurved fide Kunth, broadly lorate in the upper part tapered to the acute apex and gradually tapered downwards below the middle to a narrowly lorate basal part, 40-68 cm. long, 5.5-6.4 cm. wide in the broader upper part. *Scape* up to 50-55 cm. high ; flowers 9-16, sessile. *Perigone* : tube 10-14 cm. long, very slender ; segments 8-11 cm. long, very narrow. *Staminal cup* funnel-shaped with margins erect, 1.5-1.8 (-2) cm. high ; *filaments* 4-5.5 cm. long. *Ovary* with usually 4, sometimes 3 or 5, ovules in each cell.

GUATEMALA : Santa Rosa, Heyde & Lux 3536 ; Escuintla, Donnell Smith 2053.

CULT. : in Hort. Bot. Reg. Kew. anno 1879 ; in horto C. W. Strickland. June 1896.

H. tenuiflora was described from a cultivated plant of unknown origin, which, as the name suggests, had very slender flowers. *H. insignis* was described from a plant sent from Guatemala by Warszewitz which agrees quite well with Herbert's account of *H. tenuiflora*. In most respects the species is nearest to *H. latifolia* but it differs in the slenderer flowers, in the notably smaller staminal cup, and in the more numerous ovules. The name *H. tenuiflora* has been used for specimens which seem better referred to the next species, *H. pedalis*. This has a considerably longer perigone-tube, usually 17-22.5 cm. long, and a larger staminal cup (3-3.5 cm. high). *H. tenuiflora* could be regarded as a small-flowered variant of *H. pedalis*, but more, and better, material is needed before any worth-while opinion can be expressed on this possibility. In the meantime *H. tenuiflora* is best retained as a distinct species.

(16) **H. pedalis** Herbert, Appendix, 44 (1821) et Amaryll. 214 (1837) ; Roemer, Syn. Monogr. **4**, 172 (1847) ; Kunth, Enum. Pl. **5**, 675 (1850) ; Baker, Handb. Amaryll. 124 (1850).

Syn. *Pancratium pedale* Loddiges, Bot. Cab. **9**, t. 809 (1824).

Pancratium pedale (Herb.) Schultes, Linn. Syst. Veg. **7**, 916 (1830) ; Bot. Reg. t. 1641 (1834) ; Seubert in Mart. Fl. Bras. **3**. i. 162 (1871).

Hymenocallis senegambica Kunth & Bouché in Ind. Sem. Hort. Berol. 1848, p. 12 pro parte ; Kunth, Enum. Pl. 5, 676 (1850) pro parte ; Baker, Handb. Amaryll. 124 (1888).

? *Hymenocallis biflora* Koch & Bouché in K. Koch, Wochenschrift, 9, 369 (1866).

? *Hymenocallis niederleinii* Pax in Engler, Bot. Jahrb. 11, 326 (1891).

Leaves several, arcuate, evergreen, broad oblong or broad lorate in upper half tapering to the acute apex, tapered downwards and narrowly lorate in the lowermost third, (40)–60–90–(128) cm. long, (3·5)–5–7·4 cm. wide in the upper part, but only 1·5–2 cm. wide in the lowest third. *Scape* about 60 cm. long ; *flowers* 5–14 (or more ?), sessile. *Perigone* : *tube* (14·5)–17–19·5–(22·5) cm. long ; *segments* 10–13·5 cm. long. *Staminal cup* funnel-shaped, margins erect, (2·5)–3–3·5 cm. high ; *filaments* 5–6 cm. long. *Ovary* with 4–6 ovules in each cell.

COLOMBIA : La Balsa, Holton 143 ; Tolima, Lehmann 2270 ; Guatagin, R. Magdalena, André (sine num.) ; Rio Dagua, Lehmann 1859 (BM).

BRAZIL : Prov. Rio Janeiro, Glaziou 8011, 16385a, 17289, 20526 ; S. Anna da Chapada, Matto Grosso State, Robert 690 (BM).

AFRICA (cultivated or naturalised) : Sierra Leone, Tombo, Deighton 2766 ; Amani, Greenway 4916 ; Zanzibar, Mivera Bridge, Greenway 1359 ; near Lake Tanganyika, Clinton Baker.

CULT. : in horto Herbert. (type of *H. pedalis*).

Herbert, who described the species from a plant grown in his garden at Spofforth, says it was introduced into the Liverpool Botanic Garden but its origin was unknown. The plant figured in the Botanical Register, however, was received from Richard Harrison (also of Liverpool and closely connected with the Botanic Garden there) and the bulb was said to have been sent to him from Truxillo by a Mr. Barnard. In the *caribaea*-group of species, i.e. those characterised by leaves oblong or broadly lorate in the upper part and staminal cup funnel-form with margins erect or scarcely spreading, *H. pedalis* is outstanding by the very long perigone-tube. In this it resembles *H. littoralis*, which differs by its much narrower lorate leaves and staminal cup rotate in the upper part. Both species occur in Sierre Leone, and have been included in *H. senegambica* which was described from plants introduced from that locality.

(17) **H. arenicola** Northrop in Mem. Torr. Bot. Club, 12, 28, t. 2 (1902).

Syn. *Pancratium crassifolium* Baker in Saunders, Ref. Bot. t. 331 (1872) excl. syn.

Hymenocallis crassifolia Herb. sec. Baker, Handb. Amaryll. 125 (1888) quoad pl. Saunders.

Leaves several (about 6), erect-spreading, evergreen, sub-lorate, rounded at apex, gradually narrowed towards the base, 40–55 cm. long, 4–5·5 cm. wide but only 2·5–3·5 cm. in the lowermost part, thick and fleshy. *Scape* 40–50 cm. high ; *flowers* 4–13, sessile. *Perigone* : *tube* (4·5)–6·5–9 cm. long, *segments* 8–11 cm. long. *Staminal cup* funnel-form, margins erect

entire or conspicuously toothed, 3–3.5 cm. high; *filaments* (3.5–4) · 4.5–6 cm. long. *Ovary* with 2 ovules in each cell.

BAHAMA ISL. : Andros, Nichol's Town, April 28, 1890, *Northrop* 519 (type-collecting); sine loc. *C. Matthews* 57.

CULT. : in horto Saunders. (orig. Bahama Is.).

Outstanding in the genus by its thick fleshy lorate leaves rounded at the apex. The plant grown in Wilson Saunders' garden and figured in his Refugium Botanicum as *Pancratium crassifolium*, of which we have a specimen at Kew, is clearly *H. arenicola*, and, moreover, was believed to have come from the Bahamas. Baker identified it as *H. crassifolia* Herb., but that species was described as having obtusely acuminate leaves three feet long and two inches wide, and a "small" staminal cup. Except that the staminal cup is conspicuously toothed, Saunders' plant agrees very closely with *H. arenicola*.

(18) **H. littoralis** (Jacq.) Salisbury in Trans. Hort. Soc. London, **1**, 338 (1812); Herbert, Appendix, 44 (1821); Roemer, Syn. Monogr. **4**, 175 (1847); Baker, Handb. Amaryll. 123 (1888).

Syn. *Pancratium littorale* Jacquin, Sel. Stirp. Amer. Hist. 99, t. 179, fig. 94 (1763), et Hort. Vind. **3**, 41, t. 75 (1776), et Sel. Stirp. Amer. Hist. Adj. Icon. Autor. Archetyp. Pictis, 51, t. 101 [1780], et Amer. Gewächse Linn. Ord. t. 108 (1786), et Sel. Stirp. Amer. Hist. ed. Manhem. 125 (1788), et Icones Sel. Stirp. Amer. t. 179, fig. 94 (1797); Aiton, Hort. Kew. **1**, 412 (1789); Salisbury in Trans. Linn. Soc. London, **2**, 74, t. 13 (1794); Willdenow, L. Sp. Pl. **2**, 43 (1799); Ruiz & Pavon, Fl. Peruv. & Chil. **3**, 53 (1803); H.B.K. Nov. Gen. & Sp. **1**, 279 (1815); Ker, Genus *Pancratium* (in Quart. Journ. Sc. & Arts, **3**, 326) 11 (1817) excl. ref. Bot. Mag. t. 1879.

Pancratium americanum Miller, Gard. Dict. ed. 8. no. 7 (1768).

Pancratium littorale (β) Gawler in Bot. Mag. t. 825 (1805); Redouté, Lil. **3**, t. 154 (1806).

Pancratium dryandri Ker, Genus *Pancratium* (in Quart. Journ. Sc. & Arts, **3**, 326) 11 (1817).

Hymenocallis littoralis var. *longituba* Herbert in Bot. Mag. sub t. 2621 (1826) excl. ref. Bot. Mag. t. 1879.

Hymenocallis littoralis var. *dryandri* (Ker) Herbert, l.c. (1826).

Hymenocallis dryandri (Ker) Sweet, Hort. Brit. ed. 2, p. 513 (1830); Roemer, Syn. Monogr. **4**, 175 (1847).

Pancratium littoralis var. *dryandri* (Ker) Schultes, Linn. Syst. Veg. **7**, 919 (1830).

Hymenocallis adnata Herb. var. *princeps* Herbert, Amaryll. 215 (1837); Kunth, Enum. Pl. **5**, 677 (1850).

Hymenocallis adnata var. *driandrina* Herbert, l.c. (1837).

Hymenocallis arenaria Roemer, Syn. Monogr. **4**, 176 (1847).

Hymenocallis maritima Roemer, l.c. (1847).

Hymenocallis peruviana Roemer, l.c. (1847).

Hymenocallis (?) *americana* (Mill.) Roemer, l.c. (1847) ; Kunth, l.c. 680 (1850).

Hymenocallis adnata var. *dryandri* (Ker) Kunth, Enum. Pl. 5, 677 (1850).

Hymenocallis senegambica Kunth & Bouché, Ind. Sem. Hort. Bot. Berol. 1848, p. 12, pro parte ; Kunth, Enum. Pl. 5, 676 (1850) pro parte.

Pancratium foliis ensiformibus . . . Trew, Pl. Sel. Pinxit Ehret, Dec. 3, p. 6, t. 27 (1752).

Leaves numerous, evergreen, lorate or wide lorate in the upper part and tapered to the acute apex, gradually narrowed below the middle and narrowly lorate in the lowest third (or more) or only slightly narrowed from middle to base, 40–90(–120) cm. long, 2–3.8 cm. wide at widest, 1–2.1 cm. wide in narrow basal part. *Scape* about 45–60 cm. high; *flowers* (5)–8–11 (or more ?). *Perigone* : *tube* sometimes 17.5–20 cm. long but mostly 14–17 cm. or (var. *dryandri*) (10)–11.5–13 cm. long ; *segments* ascending and closely appressed to the staminal cup at the base, then spreading-decurved, 7.5–8 cm. long fide Jacquin, 9–11 cm. rarely 12–12.5 cm. long. *Staminal cup* funnel-form with the margins wide-spreading-rotate, (2)–2.5–3 cm., rarely 3.5 cm. long ; *filaments* 4–5.5–(6) cm. long. *Ovary* with 4–5, sometimes 8, ovules in each cell.

COLOMBIA : Tumaco, *Lehmann* sine num.

GUIANA : Surinam, *Coulon* 75 (BM) ; sine loc. *Martin* (BM).

MEXICO : San Sebastian (Fabasco) *Revirosa* 233 (?) ; Yucatan, *Gaumer* 777 (BM).

AFRICA (cultivated and naturalised) : Angola, between Ambriz and Quizembo, *Welwitsch* 4029 (BM, K), near Quizembo, *Welwitsch* 4029 (BM). Liberia, Sinoe Basin, *A. Whyte*. N. Rhodesia, Livingstone, *Rogers* 7258. Transvaal, *Young* ; Drakensberg, *Wilms* 1463 (BM).

INDIA (cultivated) : Dehra Dun, *Gamble* 27118 ; sine loc. *Haines* 3935, *Royle*.

CAROLINE IS. (cultivated) : Yap Is., *Takiol*, *Takamatsu* 1850.

CULT. : [in horto Vindob. ?], *Jacquin* (BM) ; in horto C. W. Strickland. August 1891 ; in Hort. Bot. Reg. Kew. anno 1880 ; *ibid.* (e Gold Coast E. Wolff. missit) 24 June 1937 ; in horto Malcolm. (BM).

The following belong to var. *dryandri*.

AFRICA (cultivated and naturalised) : Sierra Leone, Njola, *Deighton* 1982 ; Gold Coast, Abusi Gardens, *Irvine* 2035 ; S. Nigeria, Awka District, *N. W. Thomas* 70 ; S. Nigeria, Decema District, *P. A. Talbot* 3501 (BM).

CEYLON (naturalised ?) : *Thwaites* 2339 (BM, K).

CULT. : in horto Pitcairn. anno. 1782 (BM) ; in Hort. Bot. Reg. Kew. (e Lagos G. S. Carter. missit) October 1891 ; in horto Dickens. (orig. Lagos) August 1892 ; in Hort. Bot. Glasnevin. July 1872.

In his original account of this species, Jacquin says he found it in 1758 growing wild in great quantity on the sandy shores of the island of Terra Bomba near Cartagena (north coast of Colombia, about 10°21' N.), and

it was subsequently grown at Vienna from bulbs sent home by him. The plants originally described and figured had flowers with a very long perigone-tube, 18.5–20 cm. long. In a later figure of a cultivated plant (Sel. Stirp . . . Pictis, t. 101 : 1780) the tubes are shown 16–17.5 cm. long and these are the dimensions of the Jacquin specimen in the British Museum Herbarium. There are, however, two specimens with the larger size as first described, namely that collected by Martin in Guiana, which has the perigone-tube 20 cm. long and the segments about 7 cm., and that collected by J. S. Gamble from a plant cultivated at Dehra Dun, where the tubes are 17–19 cm. long in the dried condition. The perigone-segments of this plant, however, are 11–12.5 cm. long, whereas in Jacquin's plants they were 7.5–10 cm. long. In the rest of the material cited above the perigone-tube is either 14–17.5 cm. long or 11.5–13 cm. long, while the segments are 9–11 cm. long. The plants with the shorter perigone-tube correspond with that distinguished by Dryander (in MS.) as “ β ” and, afterwards, described as a distinct species, *Pancratium dryandri*, by Ker; this was later transferred to *Hymenocallis* by Herbert as *H. littoralis* var. *dryandri*. This name may conveniently be used for the smaller-flowered plants until more is known about variation in the species.

H. littoralis was in cultivation before 1752—i.e. long before Jacquin discovered it—for in that year Trew published a figure by Ehret of a plant grown at Chelsea, which clearly belongs to Jacquin's species. Miller mentioned Trew's illustration under *P. latifolium* Mill., but the narrow leaves are not in keeping with those of that species, and the plate would seem to belong rather to Miller's other species, *P. americanum*.

Herbert thought that Jacquin had made a mistake about the locality where he found *H. littoralis*, and was inclined to believe that it really originated from Mexico. He did not think it possible that it could have grown in the sandy littoral of an island in the tropics, and for that reason he changed the epithet to *adnata* in 1837 (l.c.). There is a specimen from Tucano, Colombia, two from Guiana, and two from Mexico, all of which appear to belong to *H. littoralis*. It is, however, impossible to state the extent of distribution of the species as a wild plant, for it has become widely distributed in cultivation in tropical regions, and become naturalised in some places. The name *H. senegambica* was given to plants from West Africa, but the species seems also to have included plants of *H. pedalis*. The Ceylon material seems to belong to *H. littoralis*, despite Thwaites' statement that the plants were indigenous.

H. littoralis is characterised by its long subulate narrow leaves, by the perigone-segments ascending and closely appressed to the staminal cup in the basal part, and by the staminal cup being funnel-form with the margins wide-spreading. Of the five varieties into which Herbert divided the species, his var. *acutifolia* seems better regarded as a distinct species, and an account of it follows.

(19) **H. acutifolia** (Herb.) Sweet, Hort. Brit. ed. 2, p. 513 (1830); Roemer, Syn. Monogr. 4, 174 (1847).

Syn. *Pancratium mexicanum* L. sec. Lindley in Bot. Reg. t. 940 (1825) non L.

Hymenocallis littoralis var. *acutifolia* Herbert in Bot. Mag. t. 2621 (1826).

Pancratium acutifolium (Herb.) Sweet, Hort. Brit. 406 (1827).

Hymenocallis adnata var. *acutifolia* (Herb.) Herbert, Amaryll. 215 (1837) ; Kunth, Enum. Pl. 5, 678 (1850).

Pancratium rotatum Ker sec. Baker in Saunders, Ref. Bot. 5, t. 357 (1880) non Ker.

Hymenocallis riparia Greenman in Proc. Amer. Acad. 41, 235 (1906).

Hymenocallis longibracteata Hochreutiner in Bull. New York Bot. Gard. 6, 265 (1910).

Bulb ovate, about 5 cm. long and 3.5–4 cm. in diameter, produced into a stout neck 4–7 cm. long ; tunics grey-brown. *Leaves* 6 or 7, linear-lorate, acute, 30–62 cm. long above the neck of the bulb, 1.4–2 cm. wide, bright green. *Scape* 25–38 cm. high ; *spathes* 5.5–12 cm. long ; *flowers* 3–6. *Perigone* : tube (7.5)–8.5–12 cm. long ; segments 8.5–11–(12) cm. long. *Staminal cup* funnel-form with the margins wide-spreading, 2–3.5(–4 ?) cm. long ; *filaments* 4–6 cm. long. *Ovary* with 4–6, sometimes 8, ovules in each cell.

MEXICO : State of Morelos, rocky river banks, barranca of Cuernavaca, 1735 m., 22 July 1904, Pringle 8952 (BM, K) ; State of Oaxaca, near Oaxaca, Andrieux 76 ; State of Michoacan, Timalcota, Langlassé 683. Morelia St. Maria, Arsène 6006 ; State of Mexico, Temascaltepec district, Hinton 938 (BM, K), 1080 (BM, K), 1123 (BM, K) ; State of Vera Cruz, Orizaba, Bourgeau 2879.

CULT. in horto A. Pam. 17 April 1940 (A.P. 307) in Guatemala anno 1934 A. Pamio lecta.

H. acutifolia was described from plants grown in this country, the bulbs having been brought from Mexico. No material of these plants has been available for examination and the species is known to me from the published figures and descriptions. There seems little doubt that it is the same as *H. riparia* and *H. longibracteata*, and it is possible that the plant described by Herbert (Amaryll. 215 : 1837) as *H. adnata* var. *staplesiana* (syn. *H. staplesii* Herb. ex Sweet, Hort. Brit. ed. 2, p. 513 : 1830 ; *H. staplesiana* (Herb.) Roemer, Syn. Monogr. 4, 175 : 1847) may be a form of the same species. *H. acutifolia* is closely allied to *H. littoralis* from which it differs by the narrower leaves and shorter perigone-tube, though it must be noted that in the latter character *H. littoralis* var. *dryandri* may not be distinguishable. In dimensions of perigone and leaves *H. acutifolia* is similar to *H. praticola* from Cuba, but that has shorter spathes, the margins of the staminal cup suberect, and the filaments shorter.

(20) **H. praticola** Britton & Wilson in Mem. Torr. Bot. Club, 16, 60 (1920).

Syn. *H. stenophylla* Urban in Fedde, Rep. Sp. Nov. 21, 53 (1925).

Pancratium angustifolium Roem. sec. Grisebach, Cat. Cub. 250 (1866) non Roem.

Bulb (in only example seen) apparently ovoid, about 3.5 cm. long and 3 cm. in diameter, produced into a neck about 3.5 cm. long, tunics dark

grey. *Leaves* linear or linear-subulate, tapered to the bluntly acute apex, only slightly narrowed to the base or narrowed in the lowest third, 25–40 cm. long, (0·7)–1·1–2·8 cm. wide. *Scape* 20–55 cm. long ; *spathes* 3·5–4·5 cm. long ; *flowers* 6–7, sessile. *Perigone* : *tube* 7–11 cm. long, slender ; *segments* 6·5–9 cm. long. *Staminal cup* funnel-form, 2–2·5 cm. long ; *filaments* 3–3·5 cm. long. *Ovary* with 4 or 5, sometimes 8, ovules in each cell.

CUBA. Province of Santa Clara, Cienegueta, *Combs* 345.

As only one specimen of this species has been available for examination, the description above has been drawn up to include the information given in the published accounts cited. *H. stenophylla* differs from *H. praticola* solely by the leaves not being tapered to the base, and by the scapes being longer, 45–55 cm. long against 20–30 cm.

From *H. acutifolia* it differs by the smaller spathes, 3·5–4·5 cm. long against 5·5–12 cm., by the perigone-segments being a little shorter than the tube instead of equal or longer, by the margins of the staminal cup being suberect instead of wide-spreading-rotate, and by the shorter filaments, 3–3·5 cm. long against 4–6 cm. In the form of its leaves it resembles *H. rotata*, *H. caroliniana*, and *H. galvestonensis*, but it is easily distinguished from the first two by its much smaller staminal cup, and from the last two by its longer filaments.

(21) ***H. rotata*** (Gawl.) Herbert, Appendix, 44 (1821) et Amaryll. 217 (1837) ; Roemer, Syn. Monogr. **4**, 174 (1847) ; Kunth, Enum. Pl. **5**, 679 (1850).

Syn. *Pancratium mexicanum* L. sec. Walter, Fl. Carol. 120 (1788) ; Michaux, Fl. Bor.-Amer. **1**, 188 (1803) ; Pursh, Fl. Amer. Sept. **1**, 221 (1814) ; Elliott, Sketch Bot. South-Carolina and Georgia, **1**, 383 (1817) ; Ker, Genus *Pancratium* (in Quart. Journ. Sc. & Arts, **3**, 328) 13, t. 3 fig. 2 (1817) ; Loddiges, Bot. Cab. **3**, t. 274 (1818) ; Le Conte in Ann. Lyceum Nat. Hist. New York, **3**, 143, t. 4 fig. 1–3 (1836) ; Savage in Herbertia, 1937, p. 98 ; non L. *Pancratium rotatum* Gawler in Bot. Mag. t. 827 (1805) ; Aiton, Hort. Kew. ed. 2, **2**, 218 (1812) ; Pursh, Fl. Amer. Sept. **1**, 222 (1814) ; Ker, Genus *Pancratium* (in Quart. Journ. Sc. & Arts, **3**, 327) 12 (1817) ; Loddiges, Bot. Cab. **1**, t. 19 (1818) ; Le Conte, l.c. **3**, 144, t. 4 fig. 4–6 (1836).

Pancratium disciforme DC. in Redouté, Lil. **3**, t. 155 (1806).

Pancratium rotatum var. *biflorum* Gawler in Bot. Mag. t. 1082 (1808) ; Ker, l.c. (1817).

Pancratium rotatum var. *pluriflorum* Gawler, l.c. (1808) ; Ker, l.c. (1817).

Hymenocallis lacera Salisbury in Trans. Hort. Soc. London, **1**, 338 (1812) excl. syn. Linn. et Catesb. ; Baker, Handb. Amaryll. 127 (1888) pro parte.

Hymenocallis paludosa Salisbury, l.c. 358 (1812).

Hymenocallis mexicana Herbert, Appendix, 44 (1821) ; Sweet, Hort. Brit. ed. 2, p. 513 (1830) ; Roemer, Syn. Monogr. **4**, 174 (1847) ; non *Pancratium mexicanum* L.

Pancratium coronarium Le Conte in Ann. Lyceum Nat. Hist. New York, **3**, 145, t. 4 fig. 7-9 (1836).

Pancratium occidentale Le Conte, l.c. 146 (1836).

Hymenocallis rotata var. *quadrifolia* Herbert, Amaryll. 217 (1837).

Hymenocallis rotata var. *disciformis* (DC.) Herbert, l.c. (1837).

Tomodon floridanum Rafinesque, Fl. Tellur. **4**, 22 (1838).

Hymenocallis disciformis (DC.) Roemer, Syn. Monogr. **4**, 173 (1847).

Hymenocallis coronaria (Le Conte) Kunth, Enum. Pl. **5**, 855 (1850).

Hymenocallis occidentalis (Le Conte) Kunth, l.c. 856 (1850).

Hymenocallis bidentata Small, Man. Southeastern Fl. 323 (1933).

Hymenocallis laciniata Small, l.c. (1933).

Hymenocallis tridentata Small, l.c. (1933).

Hymenocallis floridana (Raf.) Morton in Yearbook Amer. Amaryllis Soc. **2**, 81 (1935).

Bulb said to be sometimes stoloniferous, apparently produced upwards into a neck which in the one example seen was about 4 cm. long and 1.5 cm. in diameter; tunics grey brown. *Leaves* (4)-7-8, deciduous?, linear-lorate to broadly lorate or ensiform, shortly narrowed to the obtuse apex, slightly tapered to the base, or tapered below the middle and noticeably narrower in the lower part, 30-68 cm. long, 1.1-3.6 cm. wide at widest, 0.7-1.7 cm. wide in basal part. *Scape* about 45-60 cm. long; *spathes* 4-6.5 cm. long; *flowers* 2 or 3-(5), sessile. *Perigone*: tube 6-9.5 cm. long; *segments* spreading from the base, 6.2-9.5 cm. long. *Staminal cup* 3-4-(5) cm. long, tubulose and green in the lowest 5-10 mm., then white funnel-form to wide cupular or rotate; *filaments* 2-3 cm. long. *Ovary* with 2, sometimes 4-6, ovules in each cell.

UNITED STATES: Missouri, Campbell, *B. F. Bush* 525. Kentucky, Litchfield, *J. N. Rose*; sine loc. *C. W. Short*. Tennessee, Battle Creek Bottoms, south Pittsburg. [coll. ?] (BM). North Carolina, sine loc. *Darlington*. Georgia, Chokee Creek, Sumter Co., *Harper* 1119 (BM, E); Savannah River, at upper end of Macqueen Isl., Chatham Co., *Harper* 2179 (E). Alabama, sine loc. *Dr. Drake* ex herb. C. W. Short. Florida near Jacksonville, *A. H. Curtiss* 2831 (BM) 4732; sine loc. *A. H. Curtiss*; Big Bend, Dade Co., *Moldenke* 851 (?); Citrus Center, Glades Co., *Moldenke* 1022 (?); St. Mark's River, *Rugel* 165 (BM); sine loc. *A. W. Chapman* (BM, K).

JAMAICA: sine loc. (Cult. ?) *March* 1827.

This is the species which was early mistaken for *Pancratium mexicanum* L. (q.v.), from which it differs markedly by its longer narrower and strap-shaped leaves, by its longer scape, and larger flowers with a much larger staminal cup. How two such different species were ever confused in the first place is a mystery. When Gawler first described the present species as *Pancratium rotatum* in 1805, he expressly stated that it was not the *P. mexicanum* of Linnaeus; it is therefore curious that in his account of the genus twelve years later—when he had changed his name to Ker—he accepted as *P. mexicanum* L. a picture of a plant to which Dryander

had given that name, though the figure obviously accords much better with his own *P. rotatum* than with *P. mexicanum* L.

According to Loddiges (Bot. Cab. 3, t. 274 : 1818) the leaves of *H. rotata* die away during the latter part of the summer and new leaves appear at the beginning of winter before the flowers. The species would thus resemble *H. mexicana* and its allies in being deciduous. The literature contains no other reference to the leaves being deciduous, nor do any of the collectors mention the subject.

From the material available for examination, the species is evidently variable in the size of flowers and leaves, but it is not possible to correlate the variation with the geographical distribution—wide though this is—and the material gives the impression of representing a single variable species. The names *Pancratium disciflorum* and *P. rotatum* var. *biflorum* were given to plants which seem to differ from typical *H. rotata* solely by their smaller flowers. Authentic material of the species described by Le Conte and Small has not been available, but the plants seem to have been variants of *H. rotata* rather than distinct species. It must be noted, however, that the excellent specimens collected in Florida by Moldenke (nos. 851 and 1022) and distributed as *H. tridentata* Small, have the ovary much larger and the ovules more numerous (6, sometimes 4 or 5, in a cell against 2) than the rest of the material referred to *H. rotata*.* Apart from these features the specimens accord excellently with typical *H. rotata*. The large number of ovules in conjunction with the narrow leaves suggests the *littoralis* alliance—*H. littoralis*, *H. acutifolia*, and *H. praticola*—but in other respects the Moldenke specimens do not agree with these species. They are, however, somewhat like *H. disticha* (Sims) Herbert, Appendix 44 (1821), syn. *Pancratium distichum* Sims in Bot. Mag. t. 1879 (1817), which was referred by both Ker (Genus *Pancratium* 11, in Quart. Journ. Sc. & Arts, 3, 326 : 1817) and Herbert (Amaryll. 215 : 1837) to *H. littoralis* as a variety. *H. disticha*, which is known to me from the original figure and description only, resembles *H. rotata* very considerably, notably in the large staminal cup. The latter is quite out of keeping with *H. littoralis*, though the perigone-segments ascending at the base and closely embracing the basal part of the staminal cup accord better with *H. littoralis* than with *H. rotata*. The plant had been grown at Lee & Kennedy's nursery and was figured in 1814. In his account of it, Sims identified with it a specimen sent to him in 1816 by Herbert from his own garden. Herbert regarded his plant as distinct from Lee and Kennedy's and named it *H. littoralis* var. *disticha* (Bot. Mag. sub t. 2621 : 1826) a name which he changed to *H. adnata* var. *distichya* in his "Amaryllidaceae", p. 215, in 1837. No material of this plant is available and its identity remains uncertain. *H. rotata* is characterised by the blunt strap-shaped leaves, inflorescence normally 2- or 3-flowered, large staminal cup tubulose at the base and then cupular or almost rotate, relatively short filaments (2-3 cm. long), and by the perigone-segments spreading from the base and not curved up against the staminal cup. It is a denizen of swampy and marshy places,

* There is no record of the number of ovules for the type of *H. rotata* (i.e. the plant figured in the Botanical Magazine, t. 827). This was said to have come from Carolina, and the one specimen examined from that State seems to have had two ovules in each cell.

and was apparently first introduced into cultivation in Europe in 1790 by bulbs sent by Michaux. Study of adequate material (that is, collections showing the range of variation) from all parts of the U.S.A. where the species (sens. lat.) is found, is necessary to ascertain whether or not the name as used here covers more than one species.

(22) **H. galvestonensis** (Herb.) Baker, Handb. Amaryll. 126 (1888).

Syn. *Choretis galvestonensis* Herbert, Amaryll. 221, t. 41 fig. 34, 35 (1837) ; Kunth, Enum. Pl. 5, 681 (1850).

Bulb ovoid, about 4 cm. long and in diameter, produced into a stout neck 5–6 cm. long, tunics grey. *Leaves* about 6, deciduous ?, linear-lorate bluntly acute 26–32 cm. long (above the neck of the bulb) and 1.2–1.5 cm. wide in Texan specimens, lorate 30–46.5 cm. long and 2.5–3 cm. wide in material from Louisiana. *Scape* 26–36 cm. long above the neck of the bulb ; *spathes* erect, 4.5–6 cm. long ; *flowers* 4 or 5 (Texas) or 6 or 7 (Louisiana). *Perigone* : tube 5–7 cm. long ; *segments* 6.5–7.5 cm. long (8–9 cm. in specim. cult. Elwes.). *Staminal cup* funnel-form with the margins erect or perhaps more or less rotate, (2)–2.5–3.5 cm. long, margin entire between the filaments ; *filaments* (1.3)–1.4–1.8–(2.2) cm. long. *Ovary* with 2 ovules in each cell.

UNITED STATES. Texas, Galveston Bay, *Drummond* III. n. 412 (type) ; Houston, *E. Hall* 630 (BM, K) ; sine loc. [coll. Drummond ?] *dedit Lindley anno* 1843. Louisiana, New Orleans, *T. Drummond* 340 (BM), 370 ; *ibid. Sallé* (BM) ; *ibid. J. L. Riddell*.

CULT. : H. J. Elwes (e bulbo in Avery Is. Louisiana a H. J. Elwes. legit).

This species was described from the Drummond specimen (III. n. 412) in Hooker's herbarium, now at Kew. This is without leaves, but the Texas specimens which Bentham received from Lindley in 1843 (and which may also have been collected by Drummond) have good leaves and a bulb, and match the type in the flowers. The species is evidently related to *H. rotata* but seems, on the whole, to be a smaller plant. Thus the scape is shorter (26–36 cm. against 45–60 cm.), the perigone-tube is shorter (5–7 cm. against mostly 7–9.5), the staminal cup a little smaller, 2.5–3.5 cm. against 3–5 cm. and filaments shorter 1.4–1.8–(2.2) against 2–3 cm. On the other hand, the flowers are more numerous 4–7 instead of 2 or 3. In some specimens the staminal cup appears to be funnel-form with the margins erect, but others are pressed in such a way that the cup appears to have been more or less rotate. As indicated in the description above, the Louisiana specimens have somewhat longer and broader leaves and more flowers. In other respects they agree so well with the Texas material that I think they should be placed with it. The habitat is given as ponds for the two collectings where it is mentioned.

(23) **H. caroliniana** (L.) Herbert, Appendix, 44 (1821) ; Sweet, Hort. Brit. ed. 2, p. 513 (1830).

Syn. *Pancratium carolinianum* L. Sp. Pl. 1, 291 (1753) ; Miller, Gard. Dict. ed. 8, no. 6 (1768) ; Walter, Fl. Carol. 120 (1788) ; Ker, Rev. Genus *Pancratium*, 4 (Quart. Journ. Sc. & Arts, 3, 319) (1817) quoad syn.

Pancratium maritimum L. sec. Pursh, Fl. Amer. Septentr. **1**, 222 (1814) ; Elliott, Sketch Bot. South-Carolina & Georgia, **1**, 383 (1817) ; non L.

Lilio-Narcissus Polianthus, flore albo Catesby, Nat. Hist. Carolina, Florida and Bahama Isl. **1**, App. 5, t. 5 (1731) ; ed. rev. Edwards, **1**, App. 5, t. 5 (1754).

Bulb subglobose, about 5 cm. high and 6.5 cm. in diameter, tunics grey. *Leaves* about 5, sublorate or linear-lorate, tapered to the bluntly acute apex, slightly and gradually tapered towards the base, 30–45 cm. (or a little more ?) long, 1.3–1.7 cm. wide. *Scape* 18–20 cm. long fide Catesby, about 70 cm. in specimen seen ; *spathes* 4.5–5 cm. long ; *flowers* 5–7(8–10 fide Catesby). *Perigone* : *tube* 4.5–5.5 cm. long ; *segments* 7–8 cm. long, spreading from the base. *Staminal cup* funnel-form (or campanulate ?) with margins erect and bidentate between the filaments, 4–4.5 cm. long ; *filaments* 1.3–1.4 cm. long ; *anthers* 1.5–1.7 cm. long. *Ovary* with 2 ovules in each cell.

UNITED STATES : Alabama, sine loc. A. H. Howell anno 1913 (BM, K).

There is no specimen of this species in the Linnean Herbarium, and it would appear that Linnaeus knew it solely from the account and figure published by Catesby (l.c.). That being so, why did Linnaeus give the habitat as “in Jamaica, Carolina” ?—for Catesby says “These Plants I saw growing in a bog near *Palluchucula*, an Indian Town on the *Savanna* river within the precinct of Georgia.”

The plant illustrated by Catesby might well be mistaken for the Old World *Pancratium maritimum* L. The flowers show a striking resemblance to those of *P. maritimum* (as figured for example in the Botanical Register, t. 161) in the length of the tube and segments, in the size of the staminal cup and its toothing (two large teeth between adjacent filaments), in the short filaments and very small anthers. Moreover the segments appear to be adnate to the cup in the lower part, though not to the extent usual in *P. maritimum*. Catesby's flowers differ, however, in the cup being broader and relatively shorter, and in the filaments being erect or spreading, not incurved ; moreover the leaves are described as “deep shining green”, whereas in *P. maritimum* the leaves are glaucous.

As *P. maritimum* does not grow wild in America, and as Catesby says (p. xi) “In designing the Plants, I always did them while fresh and just gather'd”, it seems reasonable to suppose that the plant he described and figured was American and probably a species of *Hymenocallis*. That was the view taken by Salisbury (in Trans. Hort. Soc. London, **1**, 338 : 1812), who says he had bulbs in cultivation which had been collected “in a bog, about fifty miles up the river from *Savannah*, by my faithful servant, ROBERT BAGSHAW ; possibly in the identical spot where Catesby discovered his plant”. Salisbury identified the plant as *H. rotata* and explained the discrepancies between Catesby's plate and that species as being due to poor drawing. That seems reasonable, especially in view of the fact that the two specimens from Georgia which I have seen, one of them from the Savannah River, are typical *H. rotata*, but it so happens that material collected by A. H. Howell in Alabama, and of which there are sheets at the British Museum and Kew, accords better with Catesby's plant than with *H. rotata*. This material, upon which is based the des-

cription given above, differs from *H. rotata* by the more numerous flowers (5-7, not 2-3) with shorter perigone-tube, 4.5-5.5 cm. long (instead of 6-9.5 cm.), funnel-form or campanulate staminal cup (not tubulose at base and then wide cupular or rotate), and shorter filaments, 1.3-1.4 cm. long against 2-3 cm. In the characters mentioned the Alabama plant agrees well with that described by Catesby; in fact the only noteworthy differences between the two are that the Alabama plant has a tall scape, about 70 cm. long, and anthers 1.5-1.7 cm. long, whereas Catesby describes the scape of his plant as 17.5-20 cm. high and shows the anthers as only 4 mm. long. The last point is explicable only by regarding the drawing as conventionalised in this respect, for all species of *Hymenocallis* have quite long anthers. It is possible that the Alabama material and Catesby's plant, represent an anomalous variant of *H. rotata* in which the staminal cup has not developed into its typical form, the filaments are unusually short, and the perigone-tube has not reached its proper length. If that were so, then *H. caroliniana* would be the correct name for the preceding species. But the matter is one which must be resolved by direct observation in the field (or garden), and in the meantime it is advisable to maintain *H. rotata* and *H. caroliniana* as distinct species. Published references to *H. caroliniana* as a wild plant are very meagre. Walter (l.c.) scarcely more than lists the species. Elliott (l.c.) seems to have seen the plant, but Pursh (l.c.), though he puts "v.v." after the distribution "On the coasts of Carolina and Georgia" to indicate that he had seen living specimens, is open to suspicion. At all events, in a letter to J. D. Hooker in November 1873, Asa Gray wrote "Did you not know that Pursh handles his v.v. as some countryman of mine said a neighbor of his handled the truth "d-d careless". P. was never S. of the middle of Virginia".

H. caroliniana seems to have been introduced into cultivation in this country sometime between 1752 and 1759. At all events Philip Miller included it in the seventh edition of his *Gardeners Dictionary* in 1759, but not in the sixth edition of 1752. Miller's account corresponds so closely with Catesby's that it might almost have been based on it, the only differences being that Miller describes the bulb as having a "light brown skin" (whereas Catesby shows the tunics dark), and the scape as "about nine inches high" (Catesby says seven or eight inches).

The plant figured in the *Botanical Register*, t. 927 (1825) as *Pancratium carolinianum*, however, appears to be *P. maritimum*, and William Herbert states categorically (*Amaryll.* 204 : 1837) that it had glaucous leaves; the plant was well-known to him as it was grown in his brother's garden. Ker (l.c. 319, t. 3, fig. 1) accepted as *Pancratium carolinianum* a drawing of a plant grown at Kew which had been so-named by Dryander, but pointed out that it was difficult to distinguish from *P. maritimum*. There can be no doubt that the illustration is of a plant of *Pancratium maritimum*, and since, in all probability, it represents the plant included in Aiton's *Hortus Kewensis*, 1, 411 (1789), under the name *P. carolinianum*, that work has been omitted from the literature cited above.

(24) **H. sonorensis** Standley in *Publ. Field Mus. Bot. Ser.* 17, 229 (1937); Gentry, *Rio Mayo Pl.* 92, t. 13 fig. 1 (1942).

Bulb ovoid, 6–7 cm. long and 5 cm. in diameter tapering into a long neck about 9 cm. long, tunics dull grey-brown. *Leaves* 6, linear, bluntly acute, 18–31 (or more) cm. long above the neck of the bulb, 6–12 mm. wide. *Scape* 21–30 cm. long above the neck of the bulb; *spathes* narrowly triangular, 4.5–6 cm. long; *flowers* 3 or 4, sessile. *Perigone*: *tube* 10 cm. long; *segments* very narrow, 6.5–8 cm. long. *Staminal cup* about 2 cm. long, seemingly tubulose for 6–7 mm. at the base and then obconical with margins erect (but this may be a post-mortem condition); *filaments* about 3 cm. long. *Ovary* with 2, sometimes 3, ovules in each cell.

MEXICO: Alamos, Rio Fuerte, Sonora, *H. S. Gentry* 2267 (type-collecting).

Characterised by the linear leaves 6–10 mm. wide in conjunction with the long slender perigone-tube, the small staminal cup and filaments 3 cm. long. Three other species have similar linear leaves and one of them, *H. graminifolia*, is also a native of Mexico. It differs, however, from *H. sonorensis* by its very short perigone-tube, only 3.5–4 cm. long, by its much larger staminal cup, 3 cm. or more long, and by its shorter filaments, which are only 2 cm. long. The other two species with linear leaves, *H. humilis* and *H. palmeri*, are both natives of Florida; the former differs from *H. sonorensis* by its much smaller flower, while the latter is distinguished by its longer perigone-segments (8.5–10 cm. long), larger staminal cup (3 cm. long) and longer filaments (4 cm. long). There is a possibility that *H. sonorensis* may represent a narrow-leaved variant of *H. acutifolia*. It must be noted, however, that *H. sonorensis* has shorter perigone-segments, 6.5–8 cm. long against 8.5–11–(12) cm., and shorter filaments (3 cm. not 4–6 cm.). The field-note with the one collecting of *H. sonorensis* reads as follows: "Margins of arroyos and banks in lower valleys. Among first plants to flower in summer rains. Colonial; fl. white, open morning, drooping later."

(25) ***H. palmeri*** S. Watson in Proc. Amer. Acad. **14**, 301 (1879) et in Garden & Forest, **1**, 139, cum ic. (1888); Baker, Handb. Amaryll. 126 (1888); Chapman, Fl. Southern U.S. ed. 3, p. 494 (1897); Small Fl. Southeastern U.S. 291 (1903), ed. 2, p. 291 (1913); Small, Man. Southeastern Fl. 324 (1933) pro parte.

Bulb ovoid, 1.8 cm. long and 1 cm. in diameter in type-specimen, but 3–4 (or more) cm. long and 2–3 cm. in diameter produced into a neck 5–5.5 cm. long in *Rugel* 45, tunics dark grey. *Leaves* about 3, linear, to 25–30 cm. long, 4–6 mm. wide. *Scape* 12–15 cm. (*Rugel* 45) or 20–25 cm. long; *spathes* 3.5–4.5 cm. long; *flowers* solitary, sessile. *Perigone*: *tube* about 7.5–8 cm. long; *segments* filiform-linear, spreading from the base, 7.5–9–(10 ?) cm. long. *Staminal cup* funnel-form with margins erect and 1-toothed between adjacent filaments, 3–3.5 cm. long; *filaments* about 4 cm. long, but 2–2.2 cm. in *Rugel* 45.

UNITED STATES: Florida [Biscayan Bay, *Palmer* 554]; Manatee, *Rugel* 45 (BM).

No authentic material of this species has been available, and the description given is based on Sereno Watson's account and figure, and the *Rugel* specimen, which agrees tolerably well, except that the filaments are only 2 cm. long.

The first point to be noticed is that the type of *H. palmeri* has an extremely small bulb. So small is it, that the plant must almost certainly have been an offset flowering at an unusually early stage. Offsets in bulbous plants nearly always have untypical leaves when young, and commonly they are very much narrower than those of the fully grown bulb; moreover, when such small offsets flower, the bloom is often out-of-character. If *H. palmeri* does, in fact, represent a young offset from another species (and this is a matter which could be decided by observation of living plants) then almost certainly that species is *H. rotata*, which occurs in Florida and has linear-lorate leaves, 30–68 cm. long, 1.1–3.6 cm. wide at the widest, but often tapering to 0.7–1.7 cm. wide in the basal part. So far as the flower is concerned, the chief points of difference are that in *H. palmeri* the staminal cup does not seem to have been tubulose at the base, and the filaments are longer, 4 cm. against 2–3 cm. It must be noted, however, that the bulb in the Rugel specimen is well-developed, and yet it has a single flower, and, so far as one can see, linear leaves. The other linear-leaved species described from Florida, *H. humilis*, has even smaller leaves, and much smaller flowers.

Of the two Mexican species with linear leaves, *H. palmeri* is nearer to *H. sonorensis*, but this has shorter perigone-segments, smaller staminal cup, and shorter filaments.

(26) **H. humilis** S. Watson in Proc. Amer. Acad. **14**, 301 (1879) et in Garden & Forest, **1**, 114, cum ic. (1888); Baker, Handb. Amaryll. 127 (1888); Chapman, Fl. Southern U.S. ed. 3, p. 494 (1897); Small Fl. Southeastern U.S. 291 (1903), ed. 2, p. 291 (1913).

Syn. *H. palmeri* S. Wats.; Small, Man. Southeastern Fl. 324 (1933) pro parte.

Bulb apparently produced at the end of a stolon, ovoid, about 2.5 cm. long and 1.6 cm. in diameter. *Leaves* 10–15 cm. long and 4 mm. wide. *Scape* 7–7.5 cm. long; *spathes* 3–3.5 cm. long; *flowers* solitary, sessile. *Perigone*: *tube* 3–3.5 cm. long; *segments* spreading from the base, about 5 cm. long. *Staminal cup* funnel-form with margins erect, 1.6–1.7 cm. long; *filaments* 2–2.5 cm. long.

UNITED STATES: [Florida, Indian River, *Palmer* 555].

No material of this has been available, and the description is based on the published accounts and figure. Incidentally the descriptions given by Chapman and Small (1903 and 1913) are likewise taken direct from Watson. Small (1933) may be right in regarding this as conspecific with *H. palmeri*, for, like that "species", *H. humilis* may be no more than a young offset of *H. rotata* with the flower greatly reduced in size.

(27) **H. graminifolia** Greenman in Proc. Amer. Acad. **39**, 74 (1904).

Bulb ovoid-globose, about 3 cm. long, produced into a neck about 2.5 cm. long, tunics dark grey-brown. *Leaves* 6, linear, tapering to a blunt apex, 15 to over 20 cm. long above the neck of the bulb (apex of outer leaves either cut off or died back), 6–8 mm. wide. *Scape* 11.5 cm. (10–15 cm. fide Greenman) long; *spathes* ovate, acuminate, 3–3.5 cm. long; *flowers* 1–3 (–4 fide Greenman), sessile. *Perigone*: *tube* 3.5–4 cm.

long; *segments* spreading from the base, 6.5–7 cm. long. *Staminal cup* 3–3.2 cm. long, tubular in the basal 1–1.2 cm. then funnel-shaped with margins spreading; *filaments* 2 cm. long. *Ovary* with 2 ovules in each cell.

MEXICO: State of Morelos, valley near Yantepec, *Pringle* 8532 (type-collecting, BM, K).

The relatively large staminal cup tubulose at the base, with filaments about 2 cm. long, suggests that this species may be most closely allied to *H. rotata* and *H. galvestonensis*. From both it differs by its shorter and much narrower leaves, by the shorter scapes and spathes and by its shorter perigone-tube. Of the other species with linear leaves, only *H. humilis* has so short a perigone-tube, but it can be easily distinguished by its much smaller staminal cup. The other two species, *H. palmeri* and *H. sonorensis*, differ by their notably longer perigone-tubes and longer filaments; in addition *H. palmeri* has longer perigone-segments and *H. sonorensis* a much smaller staminal cup.

Resembling *H. graminifolia* in the linear leaves 5–9 mm. wide and small flower, is the specimen at Kew collected by *Pringle*, no. 4742, near Guadalajara, State of Jalisco, Mexico. It differs markedly, however, in the very small staminal cup, only 1.7–1.8 cm. long, and so far as floral characters are concerned approximates better to *H. dillenii*. The Edinburgh sheet of this collecting had broader leaves 1.4–1.5 cm. wide, and is thus intermediate between *H. graminifolia* and *H. dillenii*, where the leaves are 2–3.7 cm. wide.

IMPERFECTLY KNOWN SPECIES

Hymenocallis bistubata Herbert in Bot. Reg. 1844, Misc. p. 43; Kunth, Enum. Pl. 5, 671 (1850); Baker Handb. Amaryll. 122 (1888).

Described from a plant which flowered in Herbert's own garden at Spofforth from a bulb collected by Hartweg, the exact locality being uncertain. It had subpetiolate leaves 52 cm. long and 10 cm. wide, a scape 42.5 cm. high, with spathes 7.5 cm. long and eight flowers. The perigone-tube was 13 cm. long and the pendulous-recurved segments 8.5 cm. long, but the striking feature of the flower was the staminal cup which was described as more than 5 cm. long, cylindrical in the lower part and rotate in the upper, with quite short filaments only 2–3 cm. long. Except for the staminal cup and filaments, the description would do for *H. tubiflora*, but that species has the cup funnel-form and only 1.8–2 cm. long, with filaments 4–6.5 cm. long. Baker had not seen material of *H. bistubata*, and nothing has come to hand since his time.

Hymenocallis jaliscensis M. E. Jones, Contrib. Western Bot. No. 18, p. 33 (1933–5).

The description is too inadequate to permit identification, but the plant might possibly be *H. acutifolia*. It was collected in Mexico at Jalisco by M. E. Jones (Mex. 458: Pomona Coll. no. 119358) on June 1st 1892, and it will be necessary to see the material before an opinion can be given.

Hymenocallis* ? *paludosa Herbert, Amaryll. 219 (1837) non Salisbury (1812); Seubert in Mart. Fl. Bras. 3, i. 164 (1871).

Described from a specimen collected by Tweedie (no. 701) in very boggy places near the River Yazuguay, Rio Grande, south Brazil. The specimen belonged to Hooker's herbarium, but it cannot be found in the Kew Herbarium at present. Herbert was not sure if it was a *Hymenocallis* or *Crinum* or an undescribed genus, and it will be necessary to see the specimen before a decision can be reached.

Hymenocallis panamensis Lindley in Bot. Reg. 1841, Misc. p. 67; Kunth, Enum. Pl. 5, 679 (1850).

A plant received from Panama, which flowered in the garden of the Horticultural Society of London. The description is not complete enough to permit certain identification, but the plant may well be *H. littoralis*, as Baker suggested (Handb. Amaryll. 124 : 1888).

Hymenocallis repanda Otto & Dietrich, Allg. Gartenz. 11, 123 (1843).

A cultivated plant with leaves like those of the *caribaea*-alliance, and flowers which agree with those of *H. latifolia* except for the staminal cup which is described as almost 5 cm. long, whereas in *H. latifolia* the cup does not exceed 3 cm.

Wild Flowers.*—The purpose of this book, we are told in the preface, is to serve as an introduction to British wild flowers and in this the authors have succeeded admirably. Readers will find here an account of the history, ecology and communities of plants and from it will undoubtedly gain a better understanding of the wild flowers that grow in Britain. The most important habitats are described with their characteristic plants, the subject being presented in a pleasing manner that will hold the reader's attention from beginning to end. The author responsible for each chapter is indicated by his initials at the head of the chapter, chapter 3 being shared by both. Useful appendices contain information on collecting and making a herbarium, a selection of books of interest to British field botanists, keys, and a useful bibliography. The book is provided with a good index and is well illustrated with coloured photographs, photographs in black and white, and line drawings. The publishers have maintained the high standard set in the New Naturalist series although the colour rendering in some of the plates is not all that could be desired. There is a spelling error on p. 196 where *Atropa* is spelled "Atrofa".

This is a book full of interest which will achieve its purpose in enlightening and introducing the enthusiastic beginner to a fascinating subject.

H. S. MARSHALL.

* Wild Flowers : Botanising in Britain. By John Gilmour and Max Walters. (New Naturalist Series). Pp. xiv + 242. 45 col. photos. 27 black and white photos. and 3 line drawings. London : Collins, 1954. Price 25/-.

THE RUSTAM HERBARIUM, 'IRAQ.—PART. VIII.*

A NOTE ON THE MAPS.†

By R. A. Blakelock.

The localities on the maps include the more important ones on the labels in the Rustam Herbarium. A number of other place-names, which are not readily found in an atlas, where various botanists (Haussknecht, Kotschy, Bornmüller, Gillett, Rawi) have collected, have also been inserted.

The rainfall figures and isohyets are taken from maps compiled from the most recent available sources, including manuscript records very kindly placed at his disposal by the Meteorological Dept., Baghdad, up to June 1948 by J. B. Gillett.

The localities listed below occur in the Rustam Herbarium or in E. R. Guest's ecological account, but have not been put in the maps, so as to avoid over-filling small-sized maps with print. Some indication of their position in the country is given. The names of various places mentioned on the labels, but which have not been traced, are also included in the list.

Names not on Maps.

Ab-i-Naqt = Ab-i-Naft.

Ain Nebbi Tehran (nr. Mandali ?).

Aradin (Amadia Valley 43° 20' E., 37° 7' N.).

Arbat (13 miles S.E. of Sulaimaniya).

Awar (Nasiriya).

Ba'adara (nr. Shaikhan).

Badi (10 miles N.E. of Dohuk).

Baitnar (3 miles S.E. of Ain Sifni).

Bakhtiari Hills.

Baqasra (2½ miles S.E. of Ain Sifni).

Barbun (nr. Shaikhan).

Beribadan (Kurdistan).

Buwailir Estate.

Dor-az-Zair (in Syria, on the Euphrates).

Gali Qashk (about ½ mile N.W. of Zawita).

Gilli.

Gowair Ferry.

Gulli Mazurka = Mazurka Gorge.

Hafariya (Kut Province).

Harir Dagh (Harir is 1½ miles S.E. of Batas).

Helgurd (Bornmüller) = Arl Gird Dagh.

Harathiya Estate.

Hussainiya canal runs from the Euphrates to Karbala, there is another

Hussainiya 13½ miles W. of Kut-el-Amara.

Humaidat Nahiya (Mosul).

Iskeftendiwan (2½ miles N.E. of Shaikh Adi).

Jabal Daimka (nr. Gilli, Zakho).

*Continued from Kew Bull. 1953, 542 (1953).

†See Kew Bull. 1953, 536, 539, 541, (1953).

Jabal Kashan (nr. Gilli, Zakho).

Jabal Rubal (S. of Atrush).

Jabal Rus (nr. Gilli, Zakho).

Jabal Tanf (in Syria, $38^{\circ} 45' E.$, $33^{\circ} 32' N.$).

Jadida, as well as the one nr. Kirkuk there is a Jadida $8\frac{1}{2}$ miles N. of Haditha.

Kabal Tahlao [Tablas ?] Nukta (nr. Mandali) possibly a misreading of Galal Tahlao a watercourse which crosses the Persian frontier $8\frac{3}{4}$ miles S.E. of Mandali.

Kala.

Kale Sherwana ($45^{\circ} 20' E.$, $34^{\circ} 37' N.$).

Kandil ($45^{\circ} 5' E.$, $36^{\circ} 25' N.$).

Kashan (nr. Gilli, Zakho).

Kasr-i-Shirin ($45^{\circ} 35' E.$, $34^{\circ} 30' N.$).

Khasm Ahrar.

Koi Sanjak (55 miles N. of Kirkuk).

Koma Sang (4 miles N.E. of Mandali).

Kora (? = Khora $4\frac{3}{4}$ miles S.S.E. of Shaqlawa).

Mahad (5 miles S.E. of Ain Sifni).

Majar.

Mar Jirjis (nr. Mosul).

Matina (between Zakho, Amadia and Dohuk).

Mazurka Gorge (1 mile N. of Amadia).

Mirowa Pass (4 miles N.E. of Shaqlawa).

Murgemir (Kurdistan).

Nabbi Yunnis = Nineveh.

Na'amaniya.

Narva Raikan Nahiya (nr. Amadia).

Nawanda.

Oja ? canal nr. Ctesiphon.

Pir-i-Magrun = Pir Omar Gudrun.

Quratu (nr. Mandali, $45^{\circ} 35' E.$, $34^{\circ} 35' N.$).

Qutriya (in Kut Liwa, liwa/ = province).

Raban Hormuz ($10\frac{1}{2}$ miles S.E. of Dohuk).

Razinook ($9\frac{1}{2}$ miles E. of Rowanduz).

Salahiya = Kifri.

Shaadi (= ? Qala Shādī, 26 miles N.W. of Kut-el-Amara).

Shaglawali.

Shura (nr. Shargat).

Siba (nr. Abadan).

Suwaira (Kut Province, on R. Tigris $44^{\circ} 47' E.$, $32^{\circ} 55' N.$).

Tal Zalan (nr. Mosul).

Toweit Valley.

Um-al-Bunni ($45^{\circ} 40' E.$, $32^{\circ} 35' N.$).

Walza ($1\frac{1}{2}$ miles S. of Walash).

Zummar (nr. Tal Afar, on Tigris, $42^{\circ} 41' E.$, $36^{\circ} 45' N.$).

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Mushrooms and Toadstools.*—The subsidiary title, "A Study of the Activities of Fungi" is a better description of the scope of this book than the brief "Mushrooms and Toadstools", since these words usually apply to the Agaricaceae or gill-fungi, and here almost all groups of fungi are touched upon to some extent. In his well-known discursive style the author traverses the whole field of fungal activity and its impact on human life. The growth, sex phenomena and spore production of fungi are described, habitats are shown to be related to physiological needs, and lists are given of the fungi which are characteristic of certain plant communities. Other chapters deal with luminosity in fungi, the production of rhizomorphs and sclerotia, with a special chapter devoted to Ergot and *Cordyceps*, Fairy Rings, Dry Rot, Mycorrhiza and other fungal associations, fungi as food and the action of poisonous fungi. Mushroom-growing is described in detail and there is a chapter on truffles and truffle-hunting. The work is not intended as a handbook for the identification of the larger fungi, nevertheless a great deal of descriptive information is included, which together with the illustrations will enable beginners to recognise many of the more striking common forms. No less than three chapters, for instance, are devoted to the Gasteromycetes, that is Stinkhorns, Puff-balls, Bird's Nest Fungi and the like. The illustrations, the coloured from Koda-chromes and the uncoloured from ordinary photographs, are for the most part excellent and very attractive. As usual with colour photographs, however, some of these fall short of truth in their rendering of colour. The most common fault is excess of blue, but curiously in the figure of *Coprinus micaceus* on plate 18a (p. 131) and *Coryne sarcoides* (plate 43) it is the red tint which is too prominent; the purple colour of *Coryne* has become almost a rose-pink. It may also prove misleading to beginners that when subjects have been much enlarged or reduced no indication of this is given. In plate XIX *Clavaria fusiformis* is magnified to twice its size, but fortunately there is also a colour plate of this species (28a) with which to compare it. On the other hand there is no comparison, except with the surrounding vegetation, for the very much enlarged figures of *Geoglossum difforme* (plate 74) and *Coryne sarcoides* (pl. 43).

The final chapter is an excellent account of the discovery and production of penicillin and of the search for other antibiotics.

Throughout the book the author has interspersed facts with much history and folk-lore derived from his wide reading amongst old volumes. The style is in fact somewhat reminiscent of Jason Hill's "Curious Gardener", full of quaint extracts and odd information about fungi and fungus-collectors. The reader who sets out to read solidly from cover to cover may find the book rather hard going, but when dipped into a little at a time it is essentially a readable book, and a mine of information about fungi and their ways. The volume is completed by an extensive bibliography and an index with which is combined a glossary of such technical terms as it was impossible to avoid.

E. M. WAKEFIELD.

* *Mushrooms and Toadstools*, by J. Ramsbottom. (Collins, London. New Naturalist series, No. 7, 1953, price 30/-). pp. xiv and 306, 84 coloured plates, 58 half-tone plates.

STOMATAL SIZE, DENSITY AND MORPHOLOGY IN THE GENUS *DIANTHUS*.

R. C. CAROLIN.

INTRODUCTION.

It has been shown by Franco (1939), Sax & Sax (1937), Sax (1938) and Simmonds (1947) that stomatal size and density are correlated with ploidy. Simmonds dealt mainly with plants of a single family but Sax and Sax used stomatal density to assess polyploidy within a genus.

The present investigation was primarily undertaken to decide whether this method is applicable to *Dianthus*.

The main change occurring in polyploid series is a change in size, as ploidy increases cell size increases (Sax & Sax etc.). Stomata and epidermal cells will increase in size at approximately the same rate. Thus Stomatal Index (Salisbury 1927) will remain virtually unchanged. For this reason size and density alone were measured.

Salisbury has also shown that stomatal density and size vary very considerably with environment and position on plant, apparently correlated with water supply. *Dianthus* species, however, are mostly low growing plants of open habitats. The measurements for different species are therefore comparable and any fairly large differences in herbarium material may be attributed to genetic causes.

Differences in stomatal morphology were also noted as the investigation progressed and are included.

METHODS.

(a) Counts and Measurements.

(i) Living plants. Where these were available they were used. Strips from the abaxial surface were fixed in absolute alcohol for about 10 mins. and mounted in glycerol. Mature leaves from the middle of a non-flowering shoot were used. The chromosome numbers of all the living plants, which were used, were determined.

(ii) Herbarium material. Leaves from the same position on the plant were used. They were soaked in a detergent ("drest") for a week, a vacuum pump being used to obtain quicker penetration. They were then bleached in "Parazone", strips taken from the abaxial surface and mounted in glycerol.

10 measurements of size and density were made on every leaf. The area of the guard cells plus pore was taken as the size and is given by

$$a \times b \times 0.7854$$

where a = length and b = breadth (Franco 1939)

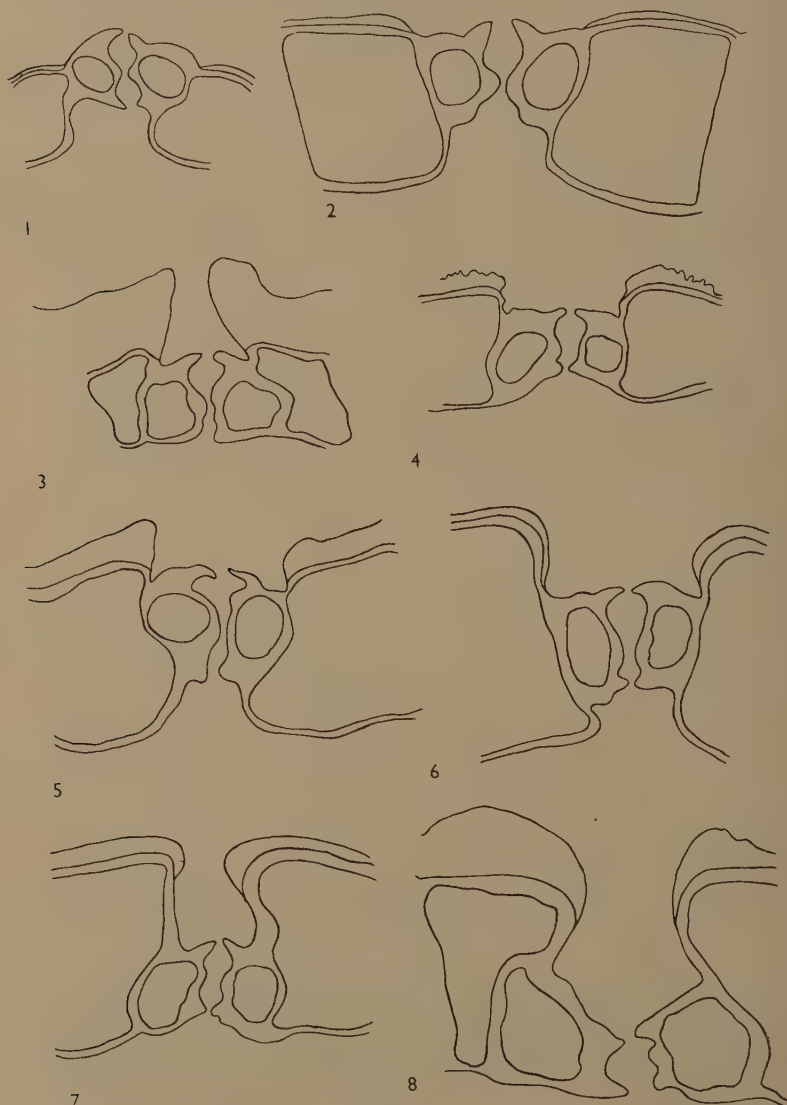
10 leaves from different shoots of a plant of *D. giganteus* and a plant of *D. seguieri* were examined. No significant differences between shoots in the size or density were noted. Variation between plants of one species was estimated by considering five plants of *D. deltoides* and four of *D. seguieri*. The samples of *D. deltoides* did not differ significantly, and those of *D. seguieri* at the $P = 0.05$ level for both size and density.

For the remaining species one leaf from one specimen only was used.

The leaves were mostly too small to obtain an accurate value for density.

(b) Morphology.

Fresh material was hand-sectioned but it was found necessary to embed herbarium material in paraffin wax after treating as for measuring, before cutting. The sections were stained with Fast Green.



STOMATAL TYPES

- | | | |
|--------------------------------|------------------------------|-----------------------------|
| 1. <i>D. tenuiflorus</i> (1a). | 2. <i>D. serotinus</i> (1b). | 3. <i>D. boissieri</i> (2). |
| 4. <i>D. gracilis</i> (3a). | 5. <i>D. requieni</i> (2). | 6. <i>D. gallicus</i> (3b). |
| 7. <i>D. inodorus</i> (3c). | 8. <i>D. arboreus</i> (3c). | × 900. |

TABLE I. STOMATAL SIZE, DENSITY AND TYPE IN
DIANTHUS SPECIES.

Species	Size (Area in μ^2)		Density D/mm ²	Type
	A	sA		
2n = 30	Average	Standard Deviation		
ARMERIA GROUP (<i>Armerium</i>)				
<i>deltoides</i> L.*	297.0	35.2	350.0	1b
<i>viscidus</i> Bory et Chaub.	298.3	21.6	142.5	1a
<i>armeria</i> L.	324.5	13.3	160.0	1b
<i>tenuiflorus</i> Griseb.*	340.7	25.3	187.5	1a
<i>pubescens</i> Sib. et Sm.*	478.6	28.2	167.5	1a
<i>corymbosus</i> Sib.†				1a
ARBOREUS GROUP (<i>Suffruticosi</i>)				
(a)				
<i>juniperinus</i> Sm.*	479.3	47.3	160.0	3c
<i>aciphyllus</i> Sieb.*	493.1	36.7	115.0	3c
<i>bisignani</i> Ten.†	881.6	69.5	55.0	3c
<i>cyprius</i> Turr. et Jack.*	887.9	99.7	132.5	3c
<i>fruticosus</i> L.†	970.7	80.0	60.0	3c
<i>arboreus</i> L.*	1234.0	82.8	65.0	3c
(b)				
<i>mercurii</i> Heldr.†	390.8	47.8	220.0	3a-1b
<i>friwaldskyanus</i> Boiss.	474.0	86.4	130.0	3a
<i>gracilis</i> Sib.*	520.0	50.8	155.0	3a
<i>rigidus</i> Bieb.†	525.6	80.7	127.0	3a
CARTHUSIANORUM GROUP (<i>Carthusianum</i>)				
<i>giganteus</i> D'Urv.*	326.9	21.2	260.0	1b
<i>pinifolius</i> Sib. et Sm.*	328.0	22.9	260.0	3a
<i>saxigenus</i> Schur.*	353.2	27.9	197.0	1b
<i>barbatus</i> L.*	464.9	59.5	260.0	1b
<i>moesiacus</i> Panc.*				3a
<i>cruentus</i> Griseb.				1b
SUPERBUS GROUP (<i>Fimbriatum</i>)				
<i>superbus</i> L.*	491.0	38.5	170.0	1b
<i>libanotis</i> Labill.				1b
LUSITANICUS GROUP (<i>Barbulatum</i>)				
<i>microlepis</i> Boiss.	290.0	19.8	285.0	3a
<i>alpinus</i> L.*	449.1	29.6	160.0	1b
<i>lusitanicus</i> Brot.*	486.5	30.3	250.0	1b
<i>multipunctatus</i> Ser.	528.6	35.8	127.5	1b
CARYOPHYLLUS GROUP (<i>Caryophyllum</i>)				
<i>caryophyllum</i> L.*	324.8	23.6	165.0	3c
<i>inodorus</i> Kern.*	353.9	22.5	187.5	3c
<i>attenuatus</i> Sm.*	354.1	29.3	200.0	3c
GRANITICUS GROUP (<i>Tetralepides Leiopetala</i>).				
<i>graniticus</i> Jord.*	316.4	25.2	172.5	3a
<i>brachyanthus</i> Boiss.	320.5	12.2	330.0	1b
var. <i>alpinus</i> Willk. et Lange*				

Species	Size (Area in μ^2)		Density		Type
	Average	Standard Deviation	D/mm ²		
CYRI GROUP					
<i>cyri</i> Fisch. et Mey.	433.1	34.0	125.0		1b
2n = 60					
FIMBRIATUM Sect. (Sec. Williams)					
<i>arenarius</i> L.*	362.7	16.7	372.5		1b
<i>petraeus</i> Wald. et Kit.	425.6	34.7	122.5		1b-2
<i>gallicus</i> Pers.*	454.0	48.6	282.5		3b
<i>stawkianus</i> Tangl, ex Knapp	507.8	36.8	145.0		1b
<i>noeanus</i> Boiss.*	515.1	23.7	212.5		1b
<i>sternbergii</i> Sieb.	557.3	14.3	105.0		1b
BARBULATUM Sect. (Sec. Williams)					
<i>haematocalyx</i> Boiss. et Heldr.	308.6	20.0	172.5		2
<i>sinensis</i> L.*	436.7	24.5	102.5		1b
<i>caesius</i> Sm.*	487.5	51.6	155.0		1b
CARYOPHYLLUM Sect. (Sec. Williams)					
<i>furcatus</i> Balb.*	409.6	19.1	147.5		1b
TETRALIPIDES LEIOPETALA Sect. (Sec. Williams)					
<i>brachyanthus</i> Boiss.*					
<i>v. ruscioniensis</i> Boiss.	403.4	36.0	325.0		1b
<i>requieni</i> Gren. et Godr.*	420.0	24.0	130.0		2
<i>hispanicus</i> Asso	548.0	46.1	137.5		2-3a
<i>strictus</i> Sib. et Sm.*	559.1	43.7	205.5		1b
2n = 90					
FIMBRIATUM Sect. (Sec. Williams)					
<i>crinitus</i> Sm.	275.8	25.5	135.0		1b-2
<i>serotinus</i> Wald. et Kit.*	542.8	32.4	155.0		1b
<i>plumarius</i> L.*	637.7	43.3	165.0		1b-3a
<i>acicularis</i> Fisch.	664.4	44.6	115.0		1b
<i>monospessulanus</i> L.*	719.6	36.0	125.0		3a
BARBULATUM Sect. (Sec. Williams)					
<i>montanus</i> Bieb.*	497.9	30.5	235.0		3a-3c
<i>seguieri</i> Vill.*	506.7	43.3	157.5		1b-3a- 3b-3c
<i>campestris</i> Bieb.*	556.3	19.5	117.5		1b-3a
<i>cinnabarinus</i> Sprun.*	608.1	49.7	142.5		1b
CARYOPHYLLUM Sect. (Sec. Williams)					
<i>boissieri</i> Willk.	481.9	24.5	130.0		2
IMPARJUGUM Sect. (Sec. Williams)					
<i>virginicus</i> L.*	629.0	48.9	127.5		1b
TETRALEPIDES LEIOPETALA Sect. (Sec. Williams)					
<i>anatolicus</i> Boiss.	433.3	32.9	185.0		3a

* = Living specimen, the chromosome number of which has been determined.

† = Chromosome number unknown but indications are that it has the number under which it is placed.

Other chromosome numbers taken from Darlington and Janaki Ammal's "Chromosome Atlas of Cultivated Plants" (1945).

Results.

(a) Variation in distribution between leaf surfaces.

The ratio of stomata on adaxial surface to stomata on abaxial surface of leaf is not uniform throughout the genus. This makes comparison of densities difficult. Species of the *armeria* group have many more on the abaxial surface, i.e. the ratio is low. The *carthusianorum* and *caryophyllus* groups have a higher ratio, except *barbatus*, which is again very low. In the *arboreus* group the ratio is about one or even more than one (Armari 1903). This ratio seems to be correlated with the degree to which the leaves are isolateral, isolateral leaves having ratios approaching one, bifacial leaves having very low ratios.

The size of the stomata does not vary with position on the leaf.

(b) Variation between polyploids.

Table I shows all the results obtained. Those of which the chromosome number has been determined are indicated. These were all grown under the same conditions and consequently environment will not enter into the factors causing stomatal variability. The averages of these measurements are entered in Table II.

Table II

2n		4n		6n	
A	D	A	D	A	D
463.5	201.6	455.67	207.75	587.2	167.8

The values of diploids and tetraploids are the converse of what is expected. Indeed the values for some of the diploid species are larger than most of the hexaploid species.

To decide if there is any difference between more closely related polyploids two races of *D. brachyanthus* Boiss. were chosen. They are fairly easily distinguished in the dry state, this was important as, in addition to living plants, herbarium material of which the chromosome number was not known, had to be used.

Four specimens of *D. brachyanthus* var. *alpinus* Willk. et Lange, from different localities had $2n = 30$; two specimens of var. *ruscioniensis* Boiss. had $2n = 60$. It was assumed that specimens with similar morphological characters had the same chromosome number. Unfortunately only four specimens of each race were available. The results are shown in Table III and the analysis of variance in Table IV.

Table III. Size of stomata in samples of *D. brachyanthus* Boiss. (for convenience the analysis is worked in units of 2μ)

Sample	A	A
	average size	standard deviation
var. <i>alpinus</i> Willk. et Lange		
1	82.89	3.77
2	83.76	5.01
3	84.46	3.71
4	80.10	3.06
var. <i>ruscioniensis</i> Boiss.		
1	100.80	2.84
2	98.70	6.40
3	122.10	7.59
4	118.70	11.58

Table IV. Analysis of Variance of data incorporated in Table III

Item	(A-A) ²	N	V	t ₁	t ₂
Varieties	14884.883	1	14884.883	16.8	4.48
Samples	4443.357	6	740.559		
Error	3767.070	72	52.3204		
Total	23095.310	79			

t₁ = Comparison with Error mean square (V) p₁ = 0.001

t₂ = Comparison with Sample mean square (V) p₂ = 0.01

This shows that there is a significant difference, even the comparison of Variety and Sample mean squares giving a significant t.

The correlation coefficient (r) between Density and Size of stomata, considering all the diploid species, is not significant. There appears to be no correlation between A and D. Likewise, the same correlation within the polyploid groups is insignificant.

(c) Stomatal Morphology

During the investigations described above, differences in stomatal type were noticed. Stomata in species of *Dianthus* can be divided into three main, and five secondary types. Fig. 1.

1. Not sunken in epidermis.

(a) Somewhat raised.

(b) Not raised.

2. Sunken because of thick cuticle.

3. Sunken because depressed below adjacent epidermal cells.

(a) Slightly sunken.

(b) Deeper but guard cells not sunken into lateral walls of adjacent epidermal cells.

(c) Deep, guard cells sunken into lateral walls of adjacent epidermal cells.

These types intergrade. It is easier to assign diploid species to a stomatal type than polyploid species as the latter are somewhat more variable. Notable in this respect is *D. seguieri* Vill. The results are incorporated in Table I.

Discussion

Related species generally have similar stomatal sizes. The *armeria* group, generally considered the most primitive, have small stomata. The *arboreus* sub-groups represent a series, or two series, showing progressively larger stomata and decreasing density. This latter is evident in sub-group (a) but the facts are misleading. The decreasing density is probably magnified by another trend, i.e. towards isolateral leaves (Tellini 1939). Those species with bifacial leaves, and therefore unequal distribution of stomata, in this group, show no significant decrease in density, c.f. *D. cyprinus*.

Other diploid species show differences in size from the *armeria* type which are not so great. *D. deltoides* which is a type with most quantitative characters smaller than *D. armeria*, also has smaller stomata. There are no other trends evident in diploid stomatal size but, as the groups used are probably not natural, trends may become apparent in the future.

The main reason for the average values of diploid and tetraploid stomatal densities being the converse of expectation is the large stomata and low densities of the *arboreus* group. The table, however, shows that some tetraploid species have smaller stomata than "related" diploids, e.g. *arenarius* and *superbus*, *petraeus* and *superbus*, etc.

This can be explained in three ways.

- (i) They are not related.
- (ii) Fertile polyploids are generally hybrids to a greater or lesser degree,—allopolyploids. The size of stomata will be influenced by each of two or more genomes. Thus an allopolyploid arising from one species with large stomata and another with small stomata may have smaller stomata than those of the former parent. If other characters of the hybrid resemble those of the parent with larger stomata the hybrid will have been classified with it rather than the parent with small stomata. Simmonds (1947) has shown that even in hybrid polyploids stomatal size varies directly as ploidy. In the case of the *Dianthus*, however, we must conclude that the closer the stomatal sizes of the parents of a polyploid (race or species) the more likely will the stomatal size of the polyploid significantly exceed those of both its parents. In general, the closer the parents are phylogenetically, the greater the probability of the stomata of their progeny being larger than those of the parents.
- (iii) A polyploid is capable of producing mutations in the same way as a diploid, although the effect is generally not so pronounced. If the diploid stomatal size has a definite advantage over larger sizes, the polyploid species, over a long period of time, could probably revert to that value. If this explanation is correct the species must be old.

All these explanations may be true for different species.

Thus with recent polyploid species stomatal size may be helpful in determining relationships. Some observations on the inheritance of this character in hybrids and allopolyploids derived therefrom are needed first.

The fact that stomatal size and density are not correlated over the whole genus is due, at least in part, to the discrepancies in distribution between the two surfaces of the leaf. The Stomatal Index may also vary.

The type of stomata seems to be useful in determining relationships. Objections have been raised to this on the grounds that the degree of sunkenness of stomata is ecologically controlled. In the case of *Dianthus* the variation due to ecology is not significant in comparison to the genetic variation as can be seen by considering the specimens grown under standard environmental conditions. Fahn (in press) has used this character of sunken stomata in *Xanthorrhoeaceae* and Léandri (1930) has discussed its use in the *Thymelaeaceae*.

The *arboreus* and *caryophyllus* groups stand apart by virtue of their sunken stomata. The *graniticus* group is almost certainly polyphyletic and this is borne out by the stomatal type.

Stojanoff & Achtaroff (1934) considered that *gracilis* intergraded with *pinifolius* and both are related to *moesiacus*. All these species have similar stomata and it seems here is a connection between the *carthusianorum*

and *arboreus* groups. Generally, *carthusianum* species from the S. Balkans have type 3a stomata, from elsewhere they are type 1b.

When these characters of stomatal size and type are considered in diploids alone the species fall into apparently natural groups. The polyploid species tend to obscure these groups, doubtless due to their hybrid origin.

This serves to emphasise the necessity of mastering diploid classification before polyploids are dealt with.

SUMMARY

1. Stomatal Density and Size were measured in a number of species of *Dianthus*.
2. It was established that Density could not be used to indicate ploidy.
3. It was established that size could not be used to indicate ploidy as many diploid species had larger stomata than hexaploid species.
4. Providing the chromosome number of a race of a species is known, the method may be useful in indicating the ploidy of other races within that species.
5. Stomatal size is of use in determining the relationships of some diploid species and may be useful with recent polyploid species.
6. Stomatal Size and Density on abaxial leaf surface are uncorrelated over species.
7. The ratio stomata on adaxial : stomata on abaxial leaf surface is correlated with leaf type and is characteristic of the group within limits.
8. Observations on stomatal type led to the description of six types which proved fairly uniform in the diploid groups and will probably be useful in working out the affinities of polyploid species.

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A SUPPLEMENT TO T. E. C. FRIES'S MONOGRAPH OF UEBELINIA.

W. B. TURRILL.

In Fedde Repertorium 19 : 81-92 (1923) there was published a "Monographie der Gattung *Uebelinia* Hochst." by Thore C. E. Fries. In this account seven species are named and described. Since 1923, one extra species, *U. kigesiensis* R. Good, has been validly published. It is fortunate that at Kew there is now material of all the eight species and of two that appear to be new. These last are described below.

Fries divides the genus into two sections • *Eu-Uebelinia* and *Trigyno-Uebelinia*. The sections are, according to Fries, separated by a number of correlated characters, mostly concerned with numbers of parts—of calyx, corolla, stamens, carpels (styles and valves), and seeds. Further investigations have necessitated some modifications in the key provided by Fries, additional to the incorporation of more species. Thus, R. W. J. Keay, in note in Herb. Kew., reports, that the specimen of *Preuss* 971 (the type number of *U. hispida* Pax) in the British Museum (Natural History), Department of Botany, has 10 stamens in the flower dissected, not 5 stamens as described by Fries. The number of stamens is variable in some material determined as *U. abyssinica*. In the type material (*Schimper* 302) there are 5 stamens. In plants grown at Kew from seeds from *Scott* 268, for example, in one flower there were 9 stamens (one opposite one petal being absent). In another flower from the same individual plant there were 5 stamens with normal anthers, 2 staminodes, and one organ half-petaloid but with one half an anther. In Uganda material (*Thomas* 305) every one of three flowers dissected had 7 or 8 stamens.

U. scottii is particularly interesting. It has the largest flowers of any species of the genus. Indeed, the petals are more or less differentiated into lamina and claw as in many species of *Silene* and other genera of *Silenoideae*. In this character there is marked contrast with all other species of the section *Eu-Uebelinia*, except *U. kigesiensis*, and the petal shape recalls more that of *U. erlangeriana* and *U. kivuensis* of the section *Trigyno-Uebelinia*. *U. spathulaefolia*, *U. abyssinica*, and *U. hispida* have extremely narrow spatulate petals not or scarcely projecting beyond the calyces and recalling the "poor petals" or even staminoidal organs found very rarely in aberrant variants of *S. maritima* and *S. vulgaris* (*S. cucubalus*).

There is obviously a tendency in the genus for a reduction in the number of ovules and seeds. *U. scottii* has 9 to 12 ovules setting up to, at least, 8 seeds, *U. kigesiensis* has about 7 ovules setting about 4 seeds, *U. abyssinica* has 3 to 8 ovules setting 3 to 5 or rarely 7 seeds, *U. erlangeriana*, *U. kivuensis*, and *U. crassifolia* have solitary ovules and solitary seeds.

Collectors and field observers are requested to record, for any species of *Uebelinia*, details concerning the habit and duration of the plants. So far as can be judged from herbarium specimens some are more or less erect, suberect, or ascending, while others have prostrate or procumbent stems and branches often rooting at the nodes. It remains, however, uncertain how far these differences are constant within the species. There is also often doubt whether the plants behave as annuals or perennials.

Uebelinia nigerica Turrill sp. nov. a *U. kigesiense* R. Good internodis in parte superiore praecipue dense hirsutis, foliorum laminis obovatis vel elliptico-obovatis, pedicellis tenuioribus saepe longioribus, floribus minoribus distinguitur.

Herba plus minusve procumbens. *Caules* usque ad 4 dm. longi, internodis 0.5–9 cm. longis in parte superiore dense hirsutis, deinde in parte inferiore minus et in seriebus duabus longitudinaliter hirsutis. *Folia* ramorum apicem versus aggregata, inferne dispersa; laminae obovatae vel elliptico-obovatae, apice rotundatae mucronulatae, basi angustatae, 1–2 cm. longae, 0.7–1.3 cm. latae, in pagina adaxiale glabrae vel fere glabrae, in pagina abaxiale saepe leviter setuloso-hispidae, margine setuloso-ciliatae; pedicelli plani, 2–3 mm. longi, hirsuti. *Flores* pedicellati, pedicellis tenuibus 1.0–1.7 cm. longis aetate elongatis usque ad circiter 2.5 cm. hirsutis. *Calyx* 4 mm. longus, hirsutus, lobis 5 lanceolatis acuminatis 2.5 mm. longis 1 mm. latis. *Petala* 5, anguste oblanceolata, emarginata, 1.5 mm. longa, alba. *Stamina* 10, 1.5 mm. longa. *Styli* 5; ovula circiter 10. *Capſula* 4 mm. longa, in calyce persistente inclusa, valvis 5 apice reflexis.

NIGERIA. Bamenda Province, Bamenda District, Bambili Bafut Ngemba, open grassland, 24.8.1951, *Edwin Ujor* F.H.I. 29994 (holotypus in Herb. Kew.).

Uebelinia scottii Turrill sp. nov. a *U. kivuense* T. C. E. Fries ovario multiovulato stylis 5 coronato differt; a *U. spathulifolia* [Hochst. ex] T. C. E. Fries foliis fere orbicularibus, petalis multo majoribus facile distinguitur.

Herba plus minusve procumbens. *Caules* usque ad 5.7 dm. longi, internodis in ramis 0.3–1.0 cm. longis in caulibus principalibus usque ad 3 cm. longis, dense patule hirsutis. *Folia* in ramis ultimis aggregata, inferne plus minusve dispersa; laminae saepissime fere orbiculares, apice rotundatae et mucronulatae, basi rotundatae vel plus minusve abrupte angustatae, 0.6–1.5 cm. longae, 0.6–1.1 cm. latae, in pagina abaxiale hirsutae, in pagina adaxiale pilis elongatis dispersis praeditae vel glabrescentes, margine setuloso-ciliatae; pedicelli plani, 1–2 mm. longi, hirsuti. *Flores* pedicellati, pedicellis 0.5–1.0 cm. longis patule hirsutis. *Calyx* 7 mm. longus, hirsutus, lobis 5 triangulari-lanceolatis acuminatis 3 mm. longis 2 mm. latis. *Internodus* inter calycem et corollam 1.5 mm. longus. *Petala* 5; lamina obovato-orbicularis, bilobata vel emarginata, 4.5 mm. longa, 4.5 mm. lata, lobis usque ad 1 mm. longis; unguis 4 mm. longus. *Stamina* 10, filamentis 5–5.5 mm. longis. *Styli* 4–5; ovula circiter 12. *Semina* subreniformia, subcompressa, circiter 1 mm. diametro, minute tuberculato-rugulosa.

ETHIOPIA. Gamo Province, Gughé highlands, Mt. Tola, occurs everywhere in short turf, c. 3000 m. and upwards, 17.12.1948, *Hugh Scott* 156 (holotypus in Herb. Kew.). Flowers usually white, more rarely pink, or white with pink shade beneath petals, perhaps turning to pink when fading but some plants have definitely pink flowers. Amaro Mountains, east slopes of Mt. Delo (5° 48' N., 37° 54' E.), 2700–3090 m., margins of bamboo, etc. forest especially in damp spots, common, 28.1.1953, *J. B. Gillett* 14981. Straggling. Flowers white and pink

outside. Mr. Gillett has the following general habitat notes for this district: "Volcanic mts., alt. 1600-3180 m. *Combretum*-grass, 1600-2000 m.; *Protea*-grass, 200-2400 m.; open grass with *Erica arborea* and *Helichrysum* over 2400 m.; evergreen forest relics, chiefly in valleys; Bamboo forest over 2800 m. Cultivation of *Hordeum* and *Musa ensete* by irrigation here and there." Mr. Gillett's material was collected at no great distance from the locality visited by Dr. Hugh Scott. The excellent specimens provided by both collectors leave no doubt of conspecificity. It is worth noting that Gillett's material has some flowers that are even larger than those in the type. The following measurements from a flower of Gillett 14981 are probably maximal not only for the species but for the genus: total flower length (flower merging into fruit and from top of pedicel to apex of persistent petals) 1.2 cm., calyx 1.0 cm. long, internode between calyx and corolla 3 mm. long, petals 10 mm. long with the broadest part of the lamina 4.5-5 mm. broad, filaments 6 mm. long; 8 seeds set and one ovule apparently unfertilized.

A new botanical dictionary.—Botany in the Iberian Peninsula would appear, from important recent publications, to be in a flourishing state. The imposing volume* noticed here, of well over a thousand pages and with numerous text illustrations, is further confirmation of the interest being shown in the study of plants in Spain. One knows, of course, that Spanish is one of the major world languages, since, outside Europe, it is the language of the Central and South American republics, apart from Brazil. Hence an important and comprehensive work of reference in Spanish may be expected to have a wide circulation. Moreover, Spanish is a typical romance language not difficult to read for anyone acquainted with Latin, French, or Italian.

Essentially this "Diccionario" is what in English would probably be termed a glossary in a wide sense. Definitions and derivations of terms from all branches of botany are given in an alphabetical sequence. Most often the definitions are clear, accurate, and concise. Sometimes a mere definition is expanded into or followed by a much fuller account of the use of the term, with examples, explanations, and so on. There is no doubt that anyone compiling an extensive botanical glossary in the future should consult this book and use it frequently. This is not to say that all the definitions are completely acceptable, since some terms, in wide use, are not always given the same meaning by all botanists, the shape referred to as "lanceolate" being one example.

Dr. Font Quer, and those of his colleagues associated with him in the preparation of this fine work, are to be sincerely congratulated on its publication.

W. B. TURRILL.

* F. Font Quer: *Diccionario Botanicá*, Editorial Labor, S. A., Madrid etc. 1953, pp. 1244.

Uses of Plant Growth Substances in Horticulture.*—After reading Professor Audus's stimulating book, it is a matter for wonder that plants were ever successfully cultivated before we knew anything about plant growth substances, or that plant physiologists were able to deal with their subject effectively without mentioning them. Nevertheless it was only a few years before the second world war that a well known Professor of Botany, when invited to Kew to attend a symposium on this subject, declined to do so on the grounds that he did not believe in it. It would be interesting to know what he would say if he were still alive. Starting with a period during which they were regarded as being solely of academic interest, plant growth substances first came to the notice of incredulous horticulturalists as chemicals that would make cuttings root, and when it was found that cuttings of certain plants failed to respond to the prescribed "hormone" treatment, they were dismissed as not worthy of the attention of those with "green fingers". In spite of their admitted limitations as aids to vegetative propagation, they are now widely used by amateur and large scale propagators alike. Besides which, as we travel about the country, we see large acreages of cereal crops rendered free from weeds by the application of these once despised substances; we see apple orchards being sprayed with them to prevent the fruit from falling too quickly at harvest time; the unfertilized fruits of tomatoes are made to set with their aid; the ripening of stored fruits is hastened, whilst the blooming of certain ornamental plants is prolonged, and fruit crops are made to shed a suitable proportion of their flowers when too numerous. It is also a comfort to know that the drudgery of removing "sprouts" from stored potatoes is no longer necessary, since plant growth substances are now available which inhibit the development of the buds on the tubers. Professor Audus tells his readers not only about these practical applications, but explains, as far as any one can with our present imperfect knowledge, the physiological processes on which they depend. Besides all this, he discusses the role these substances play in controlling flowering and the germination of seeds, and in governing the very forms that plants assume. He even leads on to the possible use of antibiotics in plant pathology. It is an intriguing story, and in this book it is well told in language that should be comprehensible to the intelligent gardener as well as to the academic botanist. Chapter 3, on the chemistry of auxins, will, however, be found difficult by those who have no knowledge of organic chemistry. For the convenience of the less scientific reader, there is a glossary of technical terms. At the end of the book there are appendixes giving more detailed directions for treating cuttings of various named species, for inducing tomatoes to set fruit, for the control of different species of weeds, and for preventing the preharvest drop of apples. There are a comprehensive bibliography, and separate indexes to authors and subjects. Although the book is well produced, it includes some omissions and minor statements that could be criticised, whilst the proof reading could perhaps have received a little more attention. Botanists and horticulturalists will, however, be so indebted to the author for providing such a clear account of such a many sided and rapidly advancing topic that these small blemishes should be readily forgiven.

C. R. METCALFE.

* *Plant Growth Substances*, by L. J. Audus. pp. xix + 465; 53 figs. London, Leonard Hill Ltd. 1953. Price 42/- net.

REVISION OF THE "FLORA OF WEST TROPICAL AFRICA"

—VI*.

R. W. J. KEAY.

STERCULIACEAE

Dombeya quinqueseta (Del.) Exell var. **senegalensis** (Planch.) Keay comb. nov.

D. senegalensis Planch. in Fl. des Serres, sér. 1, 6 : 225 (1851) ; F.W.T.A. 1 : 248 (1928).

D. multiflora (Endl.) Planch. var. *senegalensis* (Planch.) Aubrév., Fl. For. Soud.-Guin. 163, t. 29, 1-2 (1950).

Type :—Senegal, Heudelot 160 (K, holotype !).

Byttneria guineensis Keay et Milne-Redhead sp. nov., a *B. filipede* Mart. ex K. Schum. ramulis densiore aculeatis, foliis brevior petiolatis, laminis oblanceolato-oblongis apice acuminatis superne ad marginem valde crenatis, petalorum appendicibus haud filiformibus, apicem versus incrassatis distinguenda.

Frutex scandens aculeatus. *Ramuli* primarii teretes haud fistulati elongati steriles, ramulis lateralibus brevioribus floriferis ; ramuli in statu juvenili pubescentes maturitate glabrescentes, aculeis glabris recurvatis basi usque 5 mm. latis usque 3 mm. longis ad internodos dispersos armati. *Foliorum* petioli usque 5 mm. longi pubescente saepe aculeis parvis armati ; laminae oblanceolato-oblongae basi rotundatae apice acuminatae superne ad marginem crenatae usque 6 cm. longae et 2.3 cm. latae, supra, praeter costam sparse puberulam, glabrae, subtus, praeter costam et axilles nervorum pubescentes, glabrae ; costa subtus glandulo oblongo sessili basin versus praedita, saepe parce aculeata ; nervi laterales primarii utrinsecus mediani 5-6, praeter illum basi rectum, arcuato-adscedentes sub marginem anastomosantes, subtus prominuli ; rete venularum in sicco subtus valde conspicuum. *Flores* glabri, rubri, in umbellulis geminis (1-)2 (-3-4)-floribus axillaribus sparse puberulis dispositi ; pedunculi usque 3 mm. longi, ad apicem 2-3 bracteis minutis instructi ; pedicelli usque 10 mm. longi, circiter 2 mm. infra calyce articulati. *Alabastra* 5-angulata pyramidalia apice acuta minutissime papillosa. *Calyx* circiter 10 mm. diametro lobis triangularibus acutis circiter 3.5 mm. longis basi circiter 2 mm. latis. *Petali* unguis valde incurvatis circiter 1 mm. longus ; processus laterales teretes circiter 0.5 mm. longi ; appendix ligulata acuta apicem versus incrassata et teres, usque 4 mm. longa. *Androecium* circiter 1.25 mm. longum staminodiis quadrangularibus crassis apice dente mediano ornatum ; anthera sessilia. *Ovarium* ovatum tuberculatum in stylum glabrum attenuatum. *Capsulae* corpus circiter 1 cm. diametro, spinis valde inaequalibus maximis circiter 9 mm. longis armatum. *Semina* circiter 6 mm. longa et 3 mm. lata.

SIERRA LEONE : Njala, at edge of stream through land flooded during the rainy season, 19 April 1948, Deighton 4740 (K. : spiny scrambling shrub ; red flowers. Same locality, 22 April 1949, Deighton 5030 (K, holotype) : prickly scrambler ; flowers red ; fruits green with reddish tinge.

*Continued from K.B. 1953, 492 (1954).

This new species has no close affinity in Africa but is clearly related to a group well represented in tropical America by such species as *B. filipes* Mart. ex K. Schum., *B. aculeata* Willd. and *B. lanceolata* DC. Of these it seems nearest to *B. filipes* from Brasil and Paraguay.

A single specimen from Nigeria collected in December 1896 at Igbessa, Lagos Colony, and described as a "climber near river Addo", is very similar to *B. guineensis*. This specimen, Millen 194, differs as follows:— (i) primary branches obscurely angled, hollow and with large prickles, (ii) leaves with longer, less hairy petioles, and somewhat longer acumens, (iii) umbels up to 6 together each with 6–9 flowers, (iv) sepals apparently narrower. It is felt that further material of this plant is needed before making a decision about its taxonomical status.

Leptonychia occidentalis Keay sp. nov., ab *L. urophylla* Welw. ex Mast. (emend. Exell et Mendonça in Consp. Fl. Ang. 1 : 198 (1951)) staminibus fertilibus 20, petalis bilobatis differt.

[*Leptonychia urophylla* (non Welw. ex Mast.) –Hutch. et Dalz., F.W.T.A. 1 : 249 (1928), pro parte, quoad Smythe 215, Dawe 458 et 522.]

Frutex erectus vel arbuscula usque 6 m. alta. *Ramuli* glabri vel apicem versus sparse puberuli mox glabrescentes, cortice (in sicco) purpureo-brunneo vel subnigrescente reticulato obtecti. *Folia* petiolis 6–12 mm. longis, puberulis; laminae ellipticae, basi obtusae vel cuneatae, apice sensim longe acuminatae, 10·7–19·5 cm. longae, 3·3–7 cm. latae, membranaceae, supra glabrae, subtus praecipue ad nervos sparsissime puberulae; nervi laterales primarii utrinsecus mediani 5–7, praeter illum basi rectum, arcuato-adscedentes sub marginem conjuncti, supra satis obvis subtus valde prominuli. *Flores* in dichasiis axillaribus paucifloris puberulis dispositi; pedunculi usque 3 mm. longi, pedicelli usque 6 mm. longi. *Sepala* oblongo-linearum, apice acuta, 10–11 mm. longa, 1·5–1·75 mm. lata, extra sparse puberula, ad margines dense puberula, intus praecipue basin versus sparse puberula. *Petala* obcordata bilobata, circiter 1 mm. longa et 1·1–1·5 mm. lata, margines versus pilosa, ceterum glabriuscula. *Stamina* fertilia 20, staminodiis 10 anguste linearibus subaequilongis, in phalanges 5 staminum 4 et staminodiorum 2, inferne in tubum brevissimum connata; staminodia altera interiora 5, ovato-lanceolata, circiter $\frac{1}{2}$ staminum fertilium aequantia, cum phalangibus alternantia sed intra tubum inserta. *Ovarium* 3–5-loculare, obovoideo-ellipsoideum, circiter 1·5 mm. longum, dense pilosum, in stylum basi pilosum staminibus subaequilongum attenuatum. *Capsula* 3–5-locularis subglobosa, circiter 2 cm. diametro, pedicello circiter 12 mm. longo, extra muricata et dense tomentella.

SIERRA LEONE: without locality, 1915, *N. W. Thomas* 9778 (K, holotype; P; B); 8638 (K; BR); 8773 (K; MO); 8807 (K; FHI); 8829 (K; IFAN). Without locality, Jan. 1908, *Smythe* 215 (K). Hangha, Jan. 1915, *N. W. Thomas* 7782 (K). Southern Province, Feb. 1923, *Dawe* 458 (K): flowers white. Bafi River, Yamadu, July–Aug. 1923, *Dawe* 522 (K): shrub. Kambui Reserve, 19 Mar. 1914, *Lane-Poole* 187 (K): shrub to small tree. Mayombo, near Roruku, 9 July 1947, *Deighton* 4679 (K): shrub to 4 m., in high forest. Njala, 13 Feb. 1948, *Deighton* 4702 (K): tree 4 m., in forest; greenish-white flowers.

LIBERIA: Dukwia River, 29 Apr. 1929, *Cooper* 406 (K; BM): small tree, 5–6 m. high, with greenish-black bark. Webo Dist., Jabroke (Palipo), 12 July 1948, *Baldwin* 6463 (K): to 1·25 m. high. Tappita, 15 Aug. 1947, *Baldwin* 9114 (K). Kolahun Dist., Vahon, 7 Nov. 1947, *Baldwin* 10245 (K): common in virgin forest.

The description of the fruit is based on *Deighton* 4679.

This species has been confused with *L. urophylla* Welw. ex Mast., but its true affinity may well be with some other species known to me only by their descriptions. *L. occidentalis* appears, however, to be confined to an area from which no other species has previously been described.

Leptonychia pubescens Keay sp. nov., ab *L. urophylla* Welw. ex Mast. (emend. Exell et Mendonça in Consp. Fl. Ang. 1 : 198 (1951)) floribus majoribus, staminibus fertilibus 20, ramulis juvenilibus petiolisque (in sicco) ferrugineo-pubescentibus differt.

[*Leptonychia urophylla* (non Welw. ex Mast.)—Hutch. et Dalz., F.W.T.A. 1 : 249 (1928), pro parte, quoad Barter 3419, Johnson 631 et Chevalier 23404.]

Arbor usque 10 m. alta vel frutex erectus. Ramuli juveniles (in sicco) ferrugineo-pubescentes deinde glabrescentes; vetustiores cortice (in sicco) nigrescente plus minusve reticulato obtecti. Folia petiolis 5–7 mm. longis in statu juvenili (siccitate) dense ferrugineo-pubescentibus, maturitate plerumque valde ferrugineo-pubescentibus; laminae ellipticae, basi obtusae vel rotundatae, apice sensim acuminatae, 9.3–16 cm. longae, 3.7–7 cm. latae, membranaceae, supra glabrae, subtus praecipue ad nervos sparse puberulae; nervi laterales primarii utrinsecus mediani 5–7, adscendentes, leviter arcuati, sub marginem conjuncti, supra satis obvii, subtus valde prominuli. Flores in dichasiis axillaribus, 3–7-floribus puberulis dispositi; pedunculi usque 4 mm. longi, pedicelli usque 5 mm. longi. Sepala oblongo-linearum, apice obtusa, 13–14 mm. longa, circiter 2 mm. lata, ubique, praeter intus ad partem superiorem glabriusculam, puberula. Petala obdeltoidea, circiter 1.5 mm. longa et lata, margines versus dense et longe pilosa ceterum glabriuscula. Stamina fertilia 20, staminodiis 20 capillaceis subaequilongae, in phalanges 5 staminum 4 et staminodiorum 4, inferne in tubum brevissimum connata; staminodia altera interiora 5, ovato-lanceolata, circiter $\frac{1}{8}$ staminum fertilium aequantia, cum phalangibus alternantia sed intra tubum inserta. Ovarium (? 3–) 5-loculare ellipsoideo-ovoideum, circiter 3 mm. longum, dense pilosum, in stylum glabriusculum staminibus subaequilongum attenuatum. Capsula 3–5-locularis subglobosa, circiter 1.8 cm. diametro, pedicello circiter 1 cm. longo, extra muricata et dense tomentella; semen nigrum arilo coccineo cucullatum.

IVORY COAST : Anoumaba, 12–20 Nov. 1909, Chevalier 22415 (K).

GOLD COAST : near Juaben, 3 Mar. 1900, W. H. Johnson 631 (K) : small shrub; flowers sulphur yellow. Mampong, Apr. 1930, Vigne FH. 1931 (K) : tree 10 m. high; fruits with black seeds and red aril. Konongo, Apr. 1930, Vigne FH. 1932 (K) : shrub 3 m. high, in forest. Ampan, Vigne FH. 4275 (BM) : Eastern Prov., New Tafo, on bank of R. Beyera, 6 Dec. 1953, Lovi WH. 3870 (K) : bush, 3 m. high, in cacao farm.

DAHOMEY : Niaouli près Allada, dans un îlot de grande forêt, 29 Mar. 1910, Chevalier 23404 (K).

NIGERIA : Agege, near Lagos, E. W. Foster 222 (K, holotype). Attah, 1859, Barter 3419 (K) : shrub, 2.4 m.; flowers white. Abeokuta Prov., Lagos-Ibadan road by Mile 90, just south of Ilugun, 16 Feb. 1948, Keay FHI. 22484 (K; BM; FHI) : understorey tree, 6 m. high, with wide spreading crown; petioles and fruits with olive-green indumentum; seeds black with brilliant scarlet cupular arils, now very conspicuous on the trees. Ibadan Prov., Ibadan South F.R., 17 Jan. 1949, Keay FHI. 19803 (K; FHI) : shrub, bark with light fissures; branchlets pubescent, also leaf-stalk and veins of under-surface; calyx green. Same locality, 20 Apr. 1948, Keay FHI. 22802 (K; FHI) : understorey tree with several stems; to 7 m. high; bark red-brown, slash pink; stipules and petioles with brown indumentum; fruits grey-green. Ibadan Prov., Gambari Forest, W. D. MacGregor 580 (K) : shrub or small tree.

This species has been confused with *L. urophylla* Welw. ex Mast., but its true affinity may well be with some other species. Unfortunately most of the numerous species described by Engler and K. Krause from the French Cameroons regions are known to me only by their descriptions. *L. pubescens* appears, however, to differ from all these species by its characteristic brownish pubescence on the petioles and branchlets.

***Cola lateritia* K. Schum. var. *maclaudi* (A. Chev.) Brenan et Keay, comb. nov.**

Cola cordifolia (Cav.) R. Br. var. *maclaudi* A. Chev. in Bull. Soc. Bot. Fr. **55**, Mém. 8 : 32 (1908), excl. spec. Chevalier 16149.

Cola maclaudi (A. Chev.) Aubrév., Fl. For. C. Iv. **2** : 246-8, t. 222, 1-4 (1936).

Type :—French Guinea, Caille in Hb. Chev. 14766 (P, holotype ! K, isotype !).

***Cola gigantea* A. Chev. var. *glabrescens* Brenan et Keay, var. nov.**, a typo differt foliis juventute subtus sparse et minute puberulis maturitate fere glabris non griseis.

[*Cola cordifolia* (non (Cav.) R. Br.)—K. Schum. in Engl. Monogr. Afr. Sterc. 132 (1900), pro parte, quoad spec. Baumann 431 ; Hutch. et Dalz., F.W.T.A. **1** : 255 (1928), pro parte, quoad spec. Baumann 431, Yates s.n., Moloney s.n., Mildbraed 7316 et Krause s.n. ; Aubrév., Fl. For. C. Iv. **2** : 246-8, t. 222, 5-8 (1936).]

[*Cola cordifolia* (Cav.) R. Br. var. *maclaudi* A. Chev. in Bull. Soc. Bot. Fr. **55**, Mém. 8 : 32 (1908), pro parte, quoad Chevalier 16149.]

IVORY COAST : Agboville, Dec. 1909, Chevalier 22334 (K).

GOLD COAST : Tafo, 16 Sept. 1946, K. Obeng-Darko 201 (K). Eastern Prov., Asuboi, north of Nsawam, 18 Sept. 1943, H. E. Box 3485 (FHO). South Fomang Su Forest Reserve, Oct. 1930, Brown FH.2073 (FHO).

TOGO LAND : Misahöhe, Feb. 1895, Baumann 431 (K). Same locality, Nov. 1913, Mildbraed 7316 (K).

NIGERIA : Niger Prov., Agaie, Dec. 1911, Yates s.n. (K, holotype). Lagos Moloney s.n. (K). Shasha Forest Reserve, Onda to Apoge, 15 Feb. 1946, Jones & Onochie FHI. 17576 (FHI).

This plant has become widely, but wrongly, known as *Cola cordifolia*. The densely tomentose fruiting carpels of the two varieties of *C. gigantea* differ markedly from those of true *C. cordifolia* and of *C. lateritia* which are glabrous when mature.

C. cordifolia var. *puberula* A. Chev. is typical *Cola cordifolia*, a species limited to savannah regions of Senegal, Gambia, French Guinea and western French Sudan.

CAESALPINIACEAE

***Afzelia bella* Harms var. *gracilior* Keay var. nov.**, a typo habitu elato, foliolis 4-6-jugatis minoribus oblique plus minusve oblongis 4-9 cm. longis 1.5-3.8 cm. latis, petalo minore (2.3-) 3.4-3.8 (-4.3) cm. longo, petali lamina (1.2-) 1.9-2.1 cm. lata differt.

A. microcarpa A. Chev. in Vég. Util. Afr. Trop. Fr. **5** : 172 (1909), nomen nudum.

IVORY COAST : Pays Adioukrou, Dabou, 5-10 Feb. 1907, *Chevalier* 16207 (K) : arbre de 35 m. de haut, à tronc de 60-80 cm. de diam. Morénou, entre Agoua et Akouaoussou, 3 Dec. 1909, *Chevalier* 22478 (K). Abidjan, *Aubréville* 88 (K).

GOLD COAST : Ancobra River, 31 Jan. 1908, *H. N. Thompson* 7 (K). Jamang, Apr. 1926, *Vigne* 96 (K). Axim, Feb. 1934, *Irvine* 2151 (K) : tall tree, spreading, 18-30 m. high ; fruits short, rather obovate, black and beaked at end, generally 1-3-seeded, bright red aril over half as long as the seed. Kumasi, Firewood Plantation, Oct. 1953, *Andoh* FH.5811 (K, holotype ; P ; BR ; B ; FHI ; IFAN) : small tree 11 m. high, 45 cm. girth, spreading crown ; flowers white. Kumasi, Golf Course, Nov. 1953, *Andoh* FH.5815 (K ; P ; BR ; B ; FHI ; IFAN ; LISC ; BM ; A) : small spreading tree, 10 m. high, 60 cm. girth ; petal white.

This plant has been described and figured by *Aubréville* (Fl. For. C. Iv. 1 : 214, t. 79 (1936)) under the name *Afzelia bella* Harms. Typical *A. bella* var. *bella*, from Nigeria, the Cameroons, Gabon and Belgian Congo, has larger and rather fewer leaflets, a rather larger petal and is usually a shrub or small tree up to about 12 m. high. Although smaller in its foliage and petal, var. *gracilior* grows to a much greater height (35 m.). It often seems to produce small fruits with as few as 1-3 seeds, and it was such fruits which *Chevalier* must have had in mind when he named his specimen *A. microcarpa* A. Chev. (*nomen nudum*). There are, however, fruit specimens of var. *gracilior*, in the Kew herbarium, up to 12 cm. long and 5 cm. broad, well within the range of var. *bella*.

I am much indebted to the Silviculturist of the Gold Coast Forest Dept., for the ample material collected, at my request, by Mr. J. E. Andoh.

***Afzelia caudata* Hoyle** in Kew Bull. 1933 : 170 (1933).

This species is described from mixed material. The leaves, all from seedlings, and the flowers, all detached, are *A. bipindensis* Harms (1913). The fruits and seeds are however, *A. pachyloba* Harms (1913). Both species grow together in parts of S. Nigeria, and one of the cotypes (*Kennedy* 2375) of *A. caudata* consists of the seedlings of *A. bipindensis* and the fruits of *A. pachyloba*.

***Berlinia* Soland. ex Hook. f.**

The genus is named after Andreas Berlin, a Swedish pupil of Linnaeus, who worked in London under Sir Joseph Banks from 1770 until the beginning of 1773 when he went to West Africa as an assistant to *Smeathmann*. Berlin, unhappily, survived in Africa only a short time, for he died in June 1773. A specimen in the British Museum (Herb. Banks.), attributed to *Smeathmann*, but possibly collected by Berlin or jointly by the two of them, bears the manuscript name *Berlinia acuminata* given, it is said, by *Solander* who died in 1782. The genus and species were not, however, published until 1849, by J. D. Hooker in the Niger Flora.

Hooker stated that he obtained the name *Berlinia acuminata* from *Solander's* MS. in Herb. Banks. through *Planchon* who evidently considered that *Smeathmann's* specimen was conspecific with the two specimens (*Ansell* s.n. and *Heudelot* 886) which Hooker was describing. Hooker, however, evidently did not see *Smeathmann's* specimen himself.

Hooker suggested that *Ansell's* specimen was perhaps distinct from *Heudelot's* specimen. Subsequent botanists have confirmed this and referred to the latter as *B. heudelotiana* Baill. (in *Adansonia* 6 : 185, t. 3, 8-9 (1865)), a species based on the same *Heudelot* gathering.

It has in fact been evident for some time that three specimens are involved in Hooker's publication of *B. acuminata* :—(i) the *Smeathmann* specimen which Hooker had not seen, but from which he derived the name, (ii) the *Ansell* specimen, and (iii) the *Heudelot* specimen. It is therefore important to decide which of these three specimens is to be taken as the type of *B. acuminata* Soland. ex Hook. f., and hence of the genus. J. G. Baker (Leg. Trop. Afr. **3** : 683 (1930) took the *Smeathmann* specimen, but this view is quite untenable since Hooker evidently did not even see the specimen and clearly based his description on the *Ansell* and *Heudelot* specimens. The description of the species comprises elements from both these specimens, and, in describing the inflorescence which shows the most obvious difference between the two specimens, Hooker says " nunc 6–8-pollicares subsimplices " (referring to *Ansell*), then " " nunc a basi ramosi et breviores corymbum foliis breviorum formantes, " (referring to *Heudelot*). His description of the flowers is, however, based almost entirely on the *Heudelot* specimen. The *Ansell* specimen differs from the description in the following points :—(i) the lateral and inferior petals are neither " calyci subaequalia " (as in the generic description), nor " calycem aequantia " (as in the specific description), but distinctly longer than the sepals, and in more complete, less withered flowers on other more recent specimens from neighbouring localities, actually subequal in length to the larger posterior petal ; (ii) the ovary is more shortly pubescent and could scarcely be described as " villosum ". The *Ansell* specimen is in fact related to *B. bracteosa* Benth. in the Section *Macroberlinia* Harms and several specimens conspecific with it (vide, e.g. : Aubréville, Fl. For. C. Iv. **1** : 222, t. 82 B (1936)) have been misidentified as *B. bracteosa*.

There seems to me little doubt that the description of the genus *Berlinia* and the species *B. acuminata* apply far more closely to the *Heudelot* specimen than to the *Ansell* specimen, and I choose *Heudelot* 886 in the Kew herbarium as the lectotype. *B. acuminata* Soland. ex Hook. f. (1849) is therefore conspecific with *B. heudelotiana* Baill. (1865) which is based on the same type number.

Oliver in the Flora of Tropical Africa **2** : 294 (1871) pointed out that *Westia grandiflora* Vahl in Skrivt. Nat. Selsk. **6** : 118 (1810), the type of which he examined, is *Berlinia acuminata*. But *B. acuminata* of Oliver is made up of at least five species which are generally recognised as distinct today. Unfortunately subsequent botanists have not determined to which of these species *Westia grandiflora* is in fact referable, and for the revision of the Flora of West Tropical Africa I have been obliged to borrow, through the courtesy of the Director, Botanical Museum, Copenhagen, the type of Vahl's species. This was collected by Isert (at Whydah in what is now Dahomey according to the label on the specimen, but by the Volta River according to Vahl) and it turns out to be conspecific with *Heudelot* 886, the type of both *B. acuminata* and *B. heudelotiana*, having in particular the very diagnostic long-silky indumentum on the inside of the bracteoles. In some specimens of this species the leaves are quite densely pubescent beneath, but the *Isert* specimen is one of those which are very nearly glabrous.

The name *Berlinia* Soland. ex Hook. f. (1849) has been conserved against *Westia* Vahl (1810), and the new combination *B. grandiflora* (Vahl)

Hutch. et Dalz. (1928) has been made. Unfortunately Hutchinson and Dalziel applied this name to the *Ansell* specimen, and Baker (Leg. Trop. Afr. 3 : 686) went so far as to say that the *Ansell* specimen agreed with the type of *Westia grandiflora*—an obviously fallacious statement when the two type specimens are laid side by side ! The *Ansell* specimen appears in fact to be an undescribed species which I am naming *B. occidentalis* (vide infra), the *Smeathmann* specimen appears to be *B. confusa* Hoyle (vide p. 271), and the synonymy of *B. grandiflora* is as follows :—

Berlinia grandiflora (Vahl) Hutch. et Dalz., F.W.T.A. 1 : 343 (1928), quoad syn., excl. nota ; Kew Bull. 1928 : 398 (1928) ; Bak. f., Leg. Trop. Afr. 3 : 686 (1930), pro parte, excl. nota, excl. spec. *Ansell*, excl. syn. *B. prussii* De Wild.

Westia grandiflora Vahl in Skrivt. Nat. Selsk. 6 : 118 (1810) ; Macbride in Contrib. Gray Herb. n.s. 3, 59 : 20 (1919).

Berlinia acuminata Soland. ex Hook. f. in Fl. Nigrit. 326 (1849), excl. ref. Herb. Banks. MS., excl. spec. *Ansell*.

B. heudelotiana Baill. in Adansonia 6 : 185, t. 3, 8–9 (1865) ; F.W.T.A. 1 : 343 (1928) ; Bak. f., Leg. Trop. Afr. 3 : 684, pro parte, excl. syn. *B. acuminata* var. *bruneelii* De Wild., excl. var. *congolensis* Bak. f.

B. acuminata var. *heudelotiana* (Baill.) Oliv., F.T.A. 2 : 294 (1871).

Type :—Dahomey, Whydah, *Isert* s.n. (C, holotype !).

This species is particularly characteristic of fringing forest-outliers in the savannah regions. I have seen specimens from French Sudan (e.g. *Waterlot* 1108), French Guinea (*Heudelot* 886, *Pobéguin* 861), Sierra Leone (e.g. *Deighton* 4021), Ivory Coast (*Aubrév.* 826), Gold Coast (e.g. *Vigne* FH. 3834), Togoland (e.g. *Kersting* 33), Dahomey (*Isert* s.n.), N. Nigeria (e.g. *Lely* 819), W. Nigeria (e.g. *Barter* 3327), E. Nigeria (e.g. *Keay* FHI. 22707), British Cameroons (e.g. *Johnstone* 35/31), French Cameroons (e.g. *Mildbraed* 9325), Haut Oubangui (*Le Testu* 2450) and Belgian Congo (e.g. *Louis* 8585).

Berlinia occidentalis Keay sp. nov. [*Macroberlinia* Harms] affinis *B. bracteosae* Benth., sed bracteis ovatis multo minoribus, bracteolis obovato-oblanco-latis brevioribus intus dense puberulis vel tomentellis differt.

B. acuminata Soland. ex Hook. f. in Fl. Nigrit. 326 (1849), pro parte quoad spec. *Ansell*, nec quoad ref. Herb. Banks. MS., nec quoad spec. *Heudelot* (lectotypus) ; A. Chev., Explor. Bot. 229 (1920), pro parte (*Chev.* 16300).

[*B. grandiflora* (non (Vahl) Hutch. et Dalz.)—Hutch. et Dalz., F.W.T.A. 1 : 343 (1928), pro parte, excl. syn., excl. spec. ex Nigeria ; Bak. f., Leg. Trop. Afr. 3 : 686 (1930), pro parte, quoad spec. *Ansell*.]

[*B. bracteosa* (non Benth.)—Hutch. et Dalz., F.W.T.A. 1 : 343 (1928), pro parte, quoad spec. *Burton et Cameron* ex Axim ; *Aubrév.*, Fl. For. C. Iv. 1 : 222, t. 82 B (1936).]

Arbor 3–22 m. alta, ramulis glabris. Folia paripinnata ; petiolus circiter 4–5 cm. longus, rhachis circiter 16 cm. longa, glabra ; foliola 4–jugata, opposita vel subopposita, inferiora ovato-elliptica basi rotundata

apice acuminata vel acuta, 13.7–14 cm. longa, 7–7.2 cm. lata, superiora elongato-elliptica vel obovato-elliptica basi cuneata vel obtusa apice sensim acuminata, 16.5–20.8 cm. longa, 6–7 cm. lata, supra nitidula glabra minutissime punctulata, infra adpresse puberula vel glabrescentia; nervi laterales primarii utrinsecus mediani 9–12; rete venularum subtus prominulum; petioluli circiter 8 mm. longi, rugosi, sulcati, glabri. *Racemi* simplices, terminales, primum densi subsessiles, demum usque 36 cm. longi pedunculati; axis robustus, basi 9 mm. diametro, brunneo-tomentellus, cicatricibus bracteorum pedicellorumque impressis; bracteae ovatae, 1.6–2.7 cm. longae, 0.8–1.4 cm. latae, extra dense cinereo-tomentellae, intus sparse puberulae, primum imbricatae, alabastra juvenilia obtegentes, mox reflexa, per anthesin caducae; pedicelli 3.5–4 cm. longi, dense cinereo-tomentelli; bracteolae ad apicem pedicelli obovato-oblancoolatae, extra cinereo-tomentellae, dense puberulae vel tomentellae sed basin versus nonnunquam glabriusculae, 4.4–4.9 cm. longae, circiter 1.7 cm. latae, florem valvatim includentes, per anthesin patentem. *Calycis* tubus 1.5 cm. longus, extra glaber vel puberulus, lobis 5, lineari-lanceolatis inter se subaequalibus, 3–3.3 cm. longis, 3–6 mm. latis, margine ciliolatis, extra medio puberulis, intus fere glabris, mox reflexis et crispis. *Petala* 5, inter se subaequilongae, longe unguiculata, laminis latis corrugatis, extra puberula, alba; posterius alte 2-lobatum, lobis divergentibus oblongis circiter 2.5 cm. longis et 3 cm. latis, medio subfusco-venosis, ungue circiter 3 cm. longi; cetera laminis emarginatis circiter 3 cm. longis et 4.4–4.8 cm. latis, venosis, circiter 3.5 cm. unguiculata. *Stamina* 10, circiter 5.5 cm. longa, basi sparse patentem-pilosa; 9 inferiora basi in vaginam 2–2.5 mm. longam connata, decimum summum a basi librum; anthera elliptica, 3 mm. longa. *Ovarium* longiuscule stipitatum, 2–6-ovulatum, dense tomentellum; stylus glaber sed basin versus tomentellus, circiter 4 cm. longus; stigma capitatum minusculum. *Legumen* oblongum planum, 28–36 cm. longum, (8.5–) 9–11 cm. latum, glabrum, margine superiore canaliculato, 2–3 cm. stipitatum; semina 2–6, oblonga, compressa, ad hilum breviter angustata.

SIERRA LEONE: Southern Prov., 1928, *Forestry Division* comm. *Deighton* 1151 (K): tall tree; white flowers. Gorahun, 5 June 1952, *Small* 725 (K): tree 12 m. high; large white flowers; fruits (young) flat, pointed. Kambui Reserve, 20 April 1914, *Lane-Poole* 244 (K): large wide-crowned tree, 25 m. high. Gola Forest, Bagbe line, 15 May 1952, *Small* 680 (K): very large tree, gregarious in this area.

LIBERIA: Bassa Cove, *Ansell* (K). Du River, 30 July 1926, *Linder* 173 (K): pod borne at right angle to erect pedicel. Dukwia River, *Cooper* 177 (K; FHO); 217 (BM; FHO). Sinoe Co., Sasstown, 22 Mar. 1948, *Baldwin* 11604 (K, holotype): to 3 m., common here and south near coast; flowers white. Montserrado Co., Lutheran Mission above White Plains, St. Paul River, 29 Nov. 1947, *Baldwin* 10458 (K). Road to White Plains, 20 April 1952, *Barker* 1271 (K): tree, evidently young, 10 m. high; flowers white; in low-lying thicket.

IVORY COAST: Aboisso, dans le Sanvi, 1–4 April 1907, *Chevalier* 16300 (K). Abidjan, *Aubréville* 100 (K).

GOLD COAST: Axim, *Burton et Cameron* s.n. (K). Axim, beside stream in secondary forest, Feb. 1934, *Irvine* 2353 (FHO): tree up to 19–22 m. high, with greyish bark, bole slightly bent, and a spreading crown; large white flowers with 2 large ear-like bracts which enclose the flower in bud. Princetown, near sea, 14 April 1912, *Chipp* 173 (K): large tree, white flowers, fruit black, valves of pod recurved. Western Prov., Simpa, Feb. 1933, *Vigne* FH.2811 (FHO): tree, 1.5 m. girth and 22 m. high, with large white flowers.

B. bracteosa Benth. appears to reach its westernmost station in Ogoja and Calabar provinces of south-eastern Nigeria, whereas *B. occidentalis*, with which it has previously been confused, appears to be a species of the

western block of forest extending from Sierra Leone to the western part of the Gold Coast.

B. bracteosa is separated by Hauman (Inst. Roy. Colon. Belge Bull. **23** : 476 (1952)) as the monotypic genus *Macroberlinia* (Harms) Hauman, but I consider that the differences are not sufficiently important to warrant more than the sectional rank originally given by Harms. I do however restrict the genus *Berlinia* to the sections *Euberlinia* and *Macroberlinia*.

Berlinia confusa Hoyle in Kew Bull. **1934** : 184 (1934).

[*B. acuminata* Soland. ex Hook. f. in Fl. Nigrit. 326 (1849), pro parte, quoad ref. Herb. Banks. MS., nec quoad spec. Ansell et Heudelot, nec quoad descr. ; Bak. f., Leg. Trop. Afr. **3** : 683 (1930), excl. var. *velutina* A. Chev. ex Bak. f. ; Aubrév., Fl. For. C. Iv. **1** : 220, t. 82 A (1936).]

[*B. auriculata* (non Benth.)—Hutch. et Dalz., F.W.T.A. **1** : 343 (1927), pro parte, quoad spec. Aylmer 223, Deighton 647, Whyte s.n., McLeod s.n., Talbot 3340 et Dunstan s.n.]

[*B. heudelotiana* (non Baill.)—Pellegr., Lég. Gab. 63 (1948), pro parte, quoad spec. Zenker 829, 1225a, 1288, 2332 et Soyaux 73.]

Type :—Nigeria, Calabar, J. Smith 54 (K, holotype !).

This widespread species is a forest tree to 36 m. high. I have seen specimens from Sierra Leone (e.g. Smeathmann s.n., Deighton 647, King 234, 330), Liberia (e.g. Cooper 218, 283), Ivory Coast (e.g. Aubrév. 3), Gold Coast (e.g. Burton et Cameron s.n., Vigne FH. 1676), Nigeria (e.g. Adekunle FHI. 22647), French Cameroons (e.g. Zenker 1288, 2332) and Gabon (Soyaux 73).

I have been unable to find the type of *Westia parviflora* Vahl (in Skrivt. Nat. Selsk. **6** : 118 (1810)), which was a specimen collected by Smeathmann in Sierra Leone and communicated to Vahl by L'Héritier. It was not seen by Oliver, who in the Flora of Tropical Africa stated that he thought *Westia parviflora* must be generically distinct from *Berlinia*. Recent enquiries have been made on my behalf at Copenhagen, Geneva and Paris but the specimen has not been traced.

The only Smeathmann specimen of *Berlinia* at the British Museum is the one I have referred to above and have named *B. confusa* Hoyle. It seemed to me possible that this specimen might be a duplicate of the one communicated to Vahl by L'Héritier. It does not, however, agree at all well with Vahl's description of *Westia parviflora*, and it is possible that the specimen Vahl had before him was of some other genus. It seems advisable therefore to reject the name *Westia parviflora* altogether.

Berlinia congolensis (Bak. f.) Keay stat. et comb. nov.

B. heudelotiana Baill. var. *congolensis* Bak. f., Leg. Trop. Afr. **3** : 684 (1930).

B. grandiflora (Vahl) Hutch. et Dalz. var. *pseudoauriculata* Hauman in Inst. Roy. Colon. Belge Bull. **23** : 481 (1952).

[*B. auriculata* (non Benth.)—Hutch. et Dalz., F.W.T.A. **1** : 343 (1928), pro parte, quoad spec. Talbot 3110.]

[*B. acuminata* (non Soland. ex Hook. f.)—Pellegr., Lég. Gab. 64 (1948), pro parte, quoad spec. Le Testu 1713.]

NIGERIA: Ijebu Prov., Shasha Forest Reserve, primary rain forest, 26 May 1935, *P. W. Richards* 3408 (BM): tree 37 m. high, 13 m. to first branch, diameter 1.06 m., with thick, high, not widely spreading buttresses; bark light brown, scaling off in large flakes; heartwood reddish; large petal white, greenish in middle. Same locality and habitat, 23 May 1935, *P. W. Richards* 3487 (BM): tree 33 m. high, 13 m. to first branch, 0.5 m. diameter. Same locality, river-bank in rain forest, 5 May 1935, *R. Ross* 179 (BM): small tree, habit spreading. Eket District, *Talbot* 3110 (BM; K).

GABON: Région de Nyanga, 1914, *Le Testu* 1713 (BM).

ANGOLA: Cabinda, R. Luango, at Pango Munga, 15 Jan. 1916, *Gossweiler* 6146 (BM): the upgrowth of a cut down tree; leaves glossy on both faces, soft; flowering bracts large, inflorescence thyrsoid-racemose, terminal; stamens 10, calyx segments long, recoiled in flower, petals pure white, fragrant, common in wet situations along margins of river. Cabinda, Buco Zau, Feb. 1917, *Gossweiler* 7155 (BM): a short-stemmed tree up to 30 m. high, with large hemispherical heads of white flowers; common along the river banks at Buco Zau and elsewhere. Cabinda, Nkanda Mbaku near R. Luali-Chiloango, 27 Mar. 1924, *Gossweiler* 9042 (BM, holotype; K): hydrophyte, up to 20 m. high. Congo, Damba, Feb. 1942, *Gossweiler* 12784 (BM): arvore de folha persistente de 18 m. de altura; fl. branca galerias florestas do tipo Laurisilva.

BELGIAN CONGO: Matadi, July 1932, *Dacremont* 268 (K, isotype of *B. grandiflora* var. *pseudoauriculata* Hauman).

This species appears to be characteristic of forest on swampy ground by rivers. The bracteoles are narrower than in most other species of *Berlinia*.

Berlinia coriacea Keay sp. nov., ab *B. auriculata* Benth., sed bracteolis floribusque majoribus, foliis rigide coriaceis differt.

[*B. grandiflora* (non (Vahl) Hutch. et Dalz.)—Kennedy, For. Fl. S. Nig. 98 (1936).]

Arbor usque 12 m. alta. *Ramuli* glabri vel juventute minute puberuli mox glabrescentes, cortice in sicco fulvi obtecti. *Folia* glabra, paripinnata vel aborte imparipinnata, petiolis glabris, 2.5–4 cm. longis, rhachidibus glabris usque 12 cm. longis subteretibus; foliola (1–) 2–3-jugata, opposita vel subopposita, rigide coriacea, margine revoluta, petiolulis usque 1 cm. longis sulcatis in sicco ut in petiolis rhachidibusque nigrescentibus vel fuscentibus; foliola inferiora oblonga nonnunquam leviter obliqua, basi rotundata, apice breviter et obtuse acuminata, 8–11 (–16) cm. longa, 5–6.5 (–10) cm. lata; foliola superiora oblique obovato-elliptica, basi rotundata vel obtusa, apice breviter et obtuse acuminata, 13–18 (–31) cm. longa, 7–8 (–13.5) cm. lata; nervi laterales primarii utrinsecus mediani 8–13, subtus prominuli, rete venularum supra obscuro, subtus satis obvio. *Racemi* ad apicem ramulorum vel in axillis foliorum superiorum (1–) 2–3 (–7)-fasciculati, axibus minutissime puberulis, 5–9 (–14) cm. longis, bracteis obovatis usque 4 mm. longis caducissimis, pedicellis 2.5–2.8 mm. longis minute puberulis, obtecti; bracteolae ad apicem pedicelli obovatae, 3.5–4 cm. longae, 1.7–2.1 cm. latae et circiter 1 mm. crassae, utrinque minute puberulae, florem valvatim includentes, per anthesin patentes. *Calycis* tubus ore obliquo circiter 1.7 cm. longus, extra sparse pubescens vel fere glaber, lobis 5 elongato-ellipticis, 2.5–2.7 cm. longis, 5–7 mm. latis, margine ciliolato excepto, glabris, mox reflexis. *Petalum* posterius 6.5–7 cm. longum, lamina 2-lobata 3–3.5 cm. longa, 4.5–6 cm. lata, ungue 3.2–3.5 cm. longo 7–8 mm. lato basi auriculato, extra praesertim ad unguem pubescens; petala alia 4, extra pubescentia, 1.2–1.8 cm. longa, laminis linearibus 1.5–2 mm. latis, basi late auriculata usque 1 cm. lata, quam sepala multo minora. *Stamina* 10, usque 7 cm. longa, basin versus pubescentia, antheris circiter 4 mm. longis. *Ovarium* circiter 6-ovulatum,

circiter 6 mm. stipitatum, circiter 7 mm. longum, tomentellum, stylo circiter 4.5 cm. longo basin versus pubescenti; stigma capitatum. *Legumen* oblongum planum, 33-47 cm. longum, 11-12 cm. latum, extra crebre et prominenter transverse obliquo-costulatum, minute scabropustulatum, ceterum glabrum, 3.5-4 cm. stipitatum; semina 3-4, suborbicularia vel oblonga, compressa ad hilum breviter angustata, 4-8.5-1 cm. longa, 3.6-4.1 cm. lata, circiter 7 mm. crassa.

NIGERIA: Benin Prov., Sapoba, Jamieson River, *Kennedy* 207, pro parte, excl. fruct. (FHO; K); 1656 (FHO; K); 1694 (FHO, holotype; K); 1992 (FHO; K); 2180 (FHO). Ijebu Ode Prov., Omo Forest Reserve, in marsh by the stream at Gray's Camp, Fowa, 23 Mar. 1946, *A. P. D. Jones & C. F. Onochie* FHI.17031 (K): small tree up to 12 m. high and 1 m. girth; grey smooth bole; bracteoles green outside and pale yellow inside; sepals and petals green in centre and white at edge.

The description of the fruits is taken from *Kennedy* 1992.

Berlinia tomentella *Keay* sp. nov., affinis *B. hollandii* Hutch. et Dalz., sed floribus multo minoribus, petalo posteriore valde 2-lobato differt.

B. acuminata Soland. ex Hook. f. var. *velutina* A. Chev. ex Bak. f., *Leg. Trop. Afr.* 3: 684 (1930); Chev. Bot. 229, nomen nudum.

[*B. auriculata* (non Benth.)—Aubrév., *Fl. For. C. Iv.* 1: 222, t. 83 (1936).]

Arbor 3-16 m. alta, ramulis glabris vel hic illic sparse puberulis, cortice in sicco brunneo-purpurascente obtectis. *Folia* paripinnata, petiolis praesertim ad pulvinum minute puberulis, 0.5-2.7 cm. longis, rhachidibus minute puberulis, 2-18 cm. longis; foliola 2-5-jugata, opposita vel subopposita, papyracea, glabra, petiolulis 2-7 mm. longis sulcatis in sicco brunneis, facie variabili, saepe obliqua, obovato-elliptica, oblongo-elliptica, elliptico-lanceolata, oblongo-ovata, ovato-oblonga vel ovata, basi rotundata vel obtusa, apicem versus saepe longe acuminata, ad apicem ipsem obtusa, 6.5-24.5 cm. longa, 2.5-10.3 cm. lata; nervi laterales primarii utrinsecus mediani 7-9, cum rete venularum utrinque prominuli. *Flores* in racemis vel paniculis ad apicem ramulorum vel in axillis foliorum superiorum fasciculati, axibus usque 12 cm. longis, ubique (pedicellis et bracteolis inclusis) tomentellis, bracteis vix 4 mm. longis caducissimis, pedicellis (1.3-) 1.8-2.8 (-3.4) cm. longis; bracteolae ad apicem pedicelli elongato-obovatae, 2.3-2.8 cm. longae, 1-1.5 cm. latae, utrinque tomentellae, florem valvatim includentes, per anthesin patentes. *Calycis* tubus circiter 1.2 cm. longus, extra breviter tomentosus, lobis 5, oblongo-linearibus, 1.4-1.6 cm. longis, 2-3.25 mm. latis, extra puberulis et basin versus plus minusve tomentosus, intus glabriusculis, mox reflexis et crispatis. *Petalum* posterius (3.4-) 4-4.8 cm. longum, lamina valde 2-lobata (1.4-) 1.7-2.4 cm. longa, lobis obovatis (1.2-) 1.7-2.3 cm. latis, ungue 2-2.6 cm. longo, circiter 5 mm. lato, basi auriculato usque 8 mm. lato, extra praesertim ad unguem pubescens; petala alia 4, glabriuscula, 6-6.5 mm. longa, laminis linearibus circiter 0.75 mm. latis, basi late auriculata usque 3.25 mm. lata, quam sepala multo minora. *Stamina* 10, circiter 5-6 cm. longa, basin versus patentipubescentia; 9 inferiora basi in vaginam usque 1.5 cm. longam connata, decimum summum a basi liberum; anthera elliptica circiter 2.25 mm. longa. *Ovarium* dense villosum, oblongum basi oblique angustatum et breviter stipitatum, apice in stylo glabriusculo quam stamina brevior oblique angustatum, circiter 5-ovulatum. *Legumen* oblongum planum,

circiter 37 cm. longum, 8-6-10 cm. latum, extra crebre et promienter transverse-obliquo costulatum, dense tomentellum, circiter 3 cm. stipitatum; semina oblongo-suborbicularia compressa ad hilum breviter angustata, circiter 3-3 cm. longa, 2-7 cm. lata et 7 mm. crassa.

SIERRA LEONE: Pujehun², 26 Apr. 1914, *Aylmer* 61 (K): medium tree.

LIBERIA: Eastern Prov., Webo Dist.: Mnanulu, 19 June 1947, *Baldwin* 6050 (K): to 10 m., flowers white. Sarbo, 5 July 1947, *Baldwin* 6402 (K): tree to 16 m. Sarbo, 6 July 1947, *Baldwin* 6376 (K): to 8 m.

IVORY COAST: bassin de la moyenne Sassandra, Soubbré, 21 June 1907, *Chevalier* 19149 (P, holotype of *B. acuminata* var. *velutina* A. Chev. ex Bak. f.). Réserve de la Djibi, *Aubréville* 1360 (P): gros arbre à fût libre peu élevé, fleurs en juin.

GOLD COAST: without locality, 28 July 1923, *Vigne* 915 (K): a medium sized tree, generally growing on river banks; white flowers. NW. Axim, Ayawura, 1 July 1912, *Chipp* 258 (K): tree, riverside. Essuasu, alt. c. 80 m. May 1926, *Vigne* 116 (K, holotype): small tree; white flowers; generally in wet localities. Jaco, Upper Wassaw Forest Reserve, June 1926, *Vigne* 124 (FHO): small tree; white flowers. Bonsasu, May 1930, *Vigne* FH.1986 (K; FHO): tree 16 m. high and 2 m. girth, hard red timber; white flowers and big pods 38 cm. long and 10 cm. broad. Kumasi, alt. c. 300 m., July 1933, *Vigne* FH.3009 (FHO): small tree 9 m. high, spreading crown; in wet places in forest. Kwahu, Nkawkaw, 6 Feb. 1926, *King-Church* 7 (FHO): shrub. Abetifi, near streams in secondary forest, 17 July 1934, *Akpabla* 166 (FHO): tree up to 3 m. high; flowers white; branches purple. Near Agona, Sekondi-Axim road, March 1934, *Irvine* 2397 (FHO): tree up to 16 m. high; flowers white. New Half Assinie road, 24 Jan. 1947, *Foggie* FH.4946 (FHO): small tree with rounded crown in swampy secondary bush.

Chevalier 19149 differs from the other specimens I have examined in having larger lateral and anterior petals. These four petals are about 2-4 cm. long in *Chevalier* 19149 but only 6-6-5 mm. long in the other specimens. Although this difference is considerable, I do not think it is of much importance taxonomically, as *Chevalier*'s specimen agrees well with the rest of the material in other respects.

PAPILIONACEAE

By R. D. MEIKLE.

***Rhynchosia pycnostachya* (DC.) Meikle comb. nov.**

Cylista ? *pycnostachya* DC., Prodr. 2: 410 (1825).

Rhynchosia calycina Guill. et Perr., Fl. Seneg. Tent. 214 (1832); Bak. in F.T.A. 2: 217 (1871); Hutch. et Dalz., F.W.T.A. 1: 401 (1928); Bak. f., Leg. Trop. Afr. 2: 467 (1929).

The type material of *Cylista pycnostachya* DC. (Sierra Leone, *Smeathmann*) is preserved in the British Museum, and is undoubtedly the plant more widely known as *Rhynchosia calycina* Guill. et Perr., a name which must, unfortunately, be rejected under the present rules of botanical nomenclature.

***Rhynchosia minima* (Linn.) DC. var. *memnonia* (Del.) Meikle comb. nov.**

Dolichos memnonia Del. Fl. Egypt. 254, t. 38, fig. 3 (1812).

Rhynchosia memnonia (Del.) DC., Prodr. 2: 386 (1825); Bak. in F.T.A. 2: 219 (1871), pro parte; Hutch. et Dalz., F.W.T.A. 1: 401 (1928); Bak. f., Leg. Trop. Afr. 2: 473 (1929) partly.

Repeated examination satisfies me that *R. memnonia* cannot be separated from *R. minima* by any satisfactory specific character. It is a plant of arid regions distinguished from *R. minima* by its rounded, densely grey-

pubescent leaflets. *R. minima* var. *memnonia* is a variable plant ; it may form a suberect shrublet, but is more frequently a straggling, subliguous, perennial herb.

Rhynchosia minima (Linn.) DC. var. **prostrata** (Harv.) Meikle comb. nov.

R. memnonia (Del.) DC. var. *prostrata* Harv. in Fl. Cap. 2 : 253 (1862) ; Bak. f., Leg. Trop. Afr. 2 : 473 (1929).

This plant stands intermediate between typical *R. minima* and typical *R. memnonia* ; like *memnonia* it is normally a trailing herb, but lacks the silvery pubescence of that species, while it differs from *D. minima* in habit, rounded, pubescent leaflets and distinctly larger flowers. *R. memnonia* var. *prostrata* is an extremely variable plant, and it is likely that many tropical African species, allegedly distinct from *memnonia* or *minima* through shape of inflorescence, size or colour of flowers, will ultimately become synonyms of this variety.

ERIOCAULACEAE

By R. D. MEIKLE.

Eriocaulon sessile Meikle sp. nov., ab omnibus speciebus africanis capitulis sessilibus differt.

Herba annua, parva, acaulis, usque 1 cm. alta. *Radices* numerosae, albae, subspinosae. *Folia* rosulata, subulata, circiter 1.5 cm. longa, basi 1.6 mm. lata, trinervia, in parte superiore glabra, fenestrata, siccitate rubella, basin versus pilis iridescentibus intertextis. *Capitulum* sessile, primo aspectu glabrum, albidum vel pallide stramineum. *Receptaculum* pilosum. *Bractaeae* involucrales eis flores stipantibus vix distinguendae, ovatae, acuminatae, circiter 4.5 mm. longae, concavae, glabrae, albidae. *Flos* ♀ breviter stipitatus ; sepala 3, libera, subaequalia, usque 3.5 mm. longa, anguste linearia, acuminata, concava, nec carinata nec gibbosa, pilis perpaucis ornata, albida, membranacea ; petala 3, libera, subaequalia, circiter 3.0 mm. longa, filiformia, subglabra, albida, membranacea, apice nigro-glandulosa ; ovarium subglobosum ; stylus circiter 2 mm. longus ; stigmata 3, usque 2 mm. longa ; semina 3 fusco-brunnea, papillis longitudinaliter striata. *Flos* ♂ subsessilis ; sepala in spatham apice 3-lacinia coalita, albida, subglabra, membranacea ; corollae tubus usque 3 mm. longus, anguste cylindricus, albidus, hirtellus, apice in lobos 3 nigro-glandulosos divisus. *Antherae* ignotae.

FRENCH GUINEA : Dalaba, plateau about 1225 m. alt., 30 Oct. 1948, *H. des Abbayes* 777 (REN, holotype) : damp slope on a shallow bed of bare soil ; leaves always pink-tinted ; flower stalks never present, nor passing into pedunculate forms ; capitulum always sessile.

The absence of a peduncle gives the plant a remarkable appearance, quite distinct from any other African member of the *Eriocaulaceae* and perhaps unique in the family. I can find no evidence of a rudimentary stalk—the flowers are packed at the base of the pink-tinged leaves. The individual florets, male and female, are fairly typical of *Eriocaulon* ; unfortunately the anthers, to which considerable taxonomic importance is attached in this genus, are absent in these mature specimens. The leaves are tinted as in *Eriocaulon rufum* Lecomte, a species known from French Guinea and Sierra Leone.

Nigerian Vegetation.*—Nigeria, with an area of 372,674 square miles, lies wholly within the tropics. It has, and for long has had, a large population. It is doubtful how much of the vegetation can, in the strictest definition, be accepted as primitive. The kinds of vegetation met with are mainly determined by climate and forests and savannahs cover most of the uncultivated parts of the country. It is of very great value to botanists, as well as to geographers and teachers, to have a concise, accurate, and lucid account of the vegetation of so large and varied a portion of West Africa. None could have prepared this booklet better than Mr. R. W. J. Keay since he has the taxonomic and ecological knowledge necessary, combined with wide field experience. That a second edition was needed within four to five years is a fact that speaks for itself. The author, his official department, and the Government of Nigeria are all to be congratulated on the result.

The vegetation is divided into three main groupings : Forest Regions, Savannah Regions, and Montane Vegetation. Forests are subdivided into Mangrove Forests and Coastal Vegetation, Freshwater Swamp Communities, and Lowland Rain Forest Zone. The Savannah Regions show four distinguishable zones : Southern Guinea, Northern Guinea, Sudan, and Sahel. It is only in the Cameroons that a truly montane vegetation is developed.

The various plant communities are carefully described by Mr. Keay and both their floristic and ecological characteristics are clearly indicated. Twelve "profiles" of forest and savannah areas, prepared in named areas, both supplement the text and graphically portray essential structural peculiarities. Comparison of these profiles one with another is particularly instructive. An excellent "Provisional map of vegetation zones" on a scale of 1 : 3,000,000 and in colour shows the general east to west trend of major zones. There is also a very useful bibliography.

W. B. TURRILL.

* An outline of Nigerian Vegetation, by R. W. J. Keay, Government Printer, Nigeria, 1953, 5/-.

Garden Work and Terms.*—The aim of the author has been to provide a work giving technical information on garden craft not easily obtainable elsewhere and one that should serve as a glossary for the many terms, both scientific and traditional, used in garden work. It describes in a clear and logical fashion the correct methods of carrying out the many essential gardening operations and, if used as a companion volume to Sanders' Encyclopedia of Gardening, will provide a complete work of reference for almost any garden problem. The book is clearly printed and the descriptions are supplemented with over 300 illustrations.

H. S. MARSHALL.

* The Encyclopedia of Garden Work and Terms. By A. G. L. Hellyer. London : W. H. & L. Collingridge Ltd. New York : Transatlantic Arts Inc. 1954. Pp. 288. Illustr. Price 21/-.

KOLOKASI OR TARO.

S. G. HARRISON.

An unusual root vegetable observed for sale in the Soho area of London recently was the taro, dasheen or cocoyam (*Colocasia esculenta* var. *anti-quorum* (Schott) Hubb. et Rehd.).

Supplies for the English market are apparently imported from Cyprus and are consequently sold under the Cypriot name of "Kolokasi".

The plant, which is an imposing member of the family Araceae with large peltate leaves, probably originated in southern Asia, but in cultivation it has spread to most tropical and sub-tropical regions of the world, becoming firmly established and naturalized in some areas. It is an important root crop in many parts of the tropics and is believed to have been brought to the Mediterranean region, by way of Egypt, about the time of Christ (1.). It was probably grown in Cyprus at an early date, although the first known record of it in that island is in the year 1573 (3.). Holmboe (2.) mentions that it is generally cultivated in the island and was indicated as spontaneous by Sibthorp, but no doubt it had only escaped from cultivation.

Kolokasi is essentially a tropical crop requiring high temperatures and an abundant water supply. Consequently in Cyprus the crop must be grown in summer under irrigation, for although the temperature is adequate, occasionally exceeding 110°F. in the shade on the plains, the summer rainfall is very low. Propagation is by means of small daughter tubers which are separated from the sides of tubers of saleable size. The seed-tubers are planted in March or April, at a depth of about six inches, at the bottom of ditches following the contours of the land. Spacing is about 1 foot between the tubers and 3 feet between the rows. The ditches are then flooded to a depth of about six inches. Irrigation has to be repeated at intervals of about a week during the first two months, increasing to every other day in August. The crop requires full sunlight as well as a plentiful water supply. It is systematically hoed and earthed-up, a month after planting, in July, and again later if necessary. From the end of August the water supply is reduced and is stopped altogether in September or October, when the tubers are ready for lifting. They can be left in the ground and dug up as required at any time until April, when planting starts again.

Tubers selling at 1/- per lb. in London, in December, 1953, weighed about 1 lb. to 2 lb. each, but according to the retailer they not uncommonly weigh 3 lb. or more. A specimen selected at random measured about 8 inches in length and 5 inches at its broadest diameter. Its irregularly top-shaped form somewhat resembled the more familiar Swede turnip, but with a much rougher surface and reddish-brown colour. A smooth, pale yellow shoot often extends 3 or 4 inches from the broad end of the tuber. This is usually trimmed off when the tuber is being prepared for sale. Near the base of the shoot are leaf-base scars forming irregular yellowish rings and exposing rows of buds. The fibrous remains of leaves persist, in parts, and contribute towards the rough appearance of the tuber at one end, whilst the other end is marked by

what are apparently the scars of detached rootlets. Some tubers bear one or more daughter tubers in various stage of development.

Kolokasi is said to be an esteemed vegetable in Cyprus. The tubers are washed and peeled and then sliced. Some consider that they should be split with a knife and then broken into smaller pieces rather than be cut. They can be stewed, boiled, baked, fried or used in soup, and may also be candied with sugar. (4).

The tubers are imported into this country in sacks. They are said to travel well and appear to keep in fairly good condition when exposed for sale. An attempt to sell a consignment of this vegetable in Manchester last year was unsuccessful and the trade is apparently confined to London, where Cypriots and other Mediterranean peoples familiar with this vegetable are sufficiently numerous to arouse commercial interest. The Cypriot name "Kolokasi" is probably less familiar than "Taro", the name by which the vegetable is known throughout most of the Pacific region.

The writer is indebted to Mr. P. Christen for kindly providing information concerning the sale of Kolokasi in this country.

References

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2. Holmboe, J. Studies on the Vegetation of Cyprus. (1914).
3. Willimott, S. G. A Study of Colocasia. Cyprus Agr. J. **31**, 91-108 (1936).
4. Anon. Egyptian Arum (Qolqas). Egypt Min. Agr. Hort. Sect. Leaflet No. 4. (1915).

Lysenko's Agrobiology.*—This volume, which consists of a series of some twenty-seven essays on subjects connected with genetics, plant breeding and seed growing, will be perused with interest by those who wish to gain first-hand knowledge of the views of the author. The essays are essentially dialectical in character, and though the author states that the views expressed are based on fact, there is but meagre experimental data, and numerous assertions, the validity of which can be judged by the following example :—" I affirm once more that no one has ever yet produced or ever will produce any scientific proof that competition within a species exists in nature." Whatever of truth there may be in the hypothesis that environmental conditions bring about mutation, these pages scarcely place it on any surer foundation.

E.J.S.

* Agrobiology, by T. D. Lysenko. Pp. 636. Foreign Languages Publishing House, Moscow, 1954. Collets Holdings Ltd., 45, Museum St., London, W.C.1. Price 15/-.

THE MARASMIUS "CONIGENUS" COMPLEX IN BRITAIN.

D. A. REID.

In view of the existing confusion concerning the group of fungi commonly referred in British literature to "*Marasmius conigenus*", it was decided to revise the material in the Kew herbarium, filed under the following names :—*Collybia conigena*, *C. myosura*, *C. tenacella*, *C. esculenta*, and *C. stolonifer*, following Favre (1939). In that paper he stressed the importance of microscopic characters as a means of separating these fungi, and pointed out that the descriptions of the old mycologists were all inadequate as they were based on microscopic features only. He thus decided to take up the names in the sense of the first modern author to give a clear, unmistakable description, including microscopic data.

With the exception of *C. myosura* the above names appear frequently in our mycological writings. However it is practically impossible to link these names as used by the old authors such as Berkeley, Cooke, Massee and Rea, with those in the sense of Favre. Indeed, judging from their descriptions and specimens it would seem that they had no clear conceptions of these species.

Examination of the marasmioid fungi growing on coniferous cones shows that one of them can be easily distinguished from the other three in having a non-hymeniform cuticle, minute amyloid spores, and thin walled non-encrusted cystidia on the gill edge.

Brébinaud (1926) reserved the name *Collybia myosura* for the fungus growing on pine cones, having very crowded gills and small spores $3 \times 2\mu$. Konrad (1931) was however the first person to give a detailed account of this species—again as *C. myosura*. He mentioned the small ellipsoid-oval spores $3\text{--}4.5 \times 1.2\mu$, the swollen-fusoid, non-encrusted cystidia with attenuated obtuse apices, the non-hymeniform cuticle and mild tasting flesh. In addition he stated that it occurred in troops in coniferous forests on cones of pines, firs, cedars, etc., that it grew in summer and autumn, was rather rare and less common than *Collybia tenacella*.

This excellent description, together with that of Konrad and Maublanc (1924–1933), where they also gave a coloured illustration (pl. 206 II), has been largely responsible for the acceptance of this name by modern mycologists.

Kühner (1938) transferred it to the genus *Mycena* under a section he called *Xeromycena*. He said of this section "This split may be considered as a simple section of the genus *Mycena*, or as an independent genus, having for the type species *Collybia myosura* (Fr.)." However, there was no latin diagnosis so this generic name was not validly published. Singer (1938) erected a new genus—*Baeospora*, with *B. (Collybia, Marasmius) myosura* as the type species, and was followed by Favre (1939), who also adopted this name.

Kühner and Romagnesi (1953) have, unfortunately, taken up the name *Collybia conigena* for this species listing *C. myosura* as a synonym—despite the fact that the plate of *C. myosura* (T. 65, fig. 4) in the Fries Icones shows a delicate fungus with crowded gills and a dark brown colour, whilst that of *C. conigena* (T. 67 fig. 3) shows a much more robust

fungus with more widely spaced gills and an ochraceous colouration. The latter figure is not at all like the small fungus which we have come to know as *Baeospora myosura*, whilst the former resembles it much more closely. Pearson and Dennis (1948) listed it as *Marasmius myosurus* (Wulf. ex Fr.) Karst. under the sub-section *Baeospora* Singer and give *M. conigenus* (Pers. ex Fr.) Karst. as a synonym adding "In the Syst. Myc., *myosurus* comes first followed by *conigenus* for the same species. As the latter epithet has been used by several authors for other species it is better to adopt *myosurus* as less confusing for the brownish agaric common on pine cones in the Autumn".

In my own view the best course and the one least likely to cause confusion is to adopt the name *Baeospora myosura* (Fr.) Singer for the species with small amyloid spores.

Further study of herbarium material shows that there are three other fungi separable on the form of their cystidia. These are at once distinguished from *B. myosura* in having a hymeniform cuticle, non-amyloid spores and capitate cystidia with more or less thickened walls.

Patouillard (1883-1886) under the name *Agaricus (Collybia) conigenus* gave a fairly good description of a fungus with protruding cystidia which were swollen, narrowing toward the apex and swelling again into a terminal head, whilst attenuated at the base. He also noted that these cystidia were covered at their apices with large irregular crystalline deposits, and gave a figure of them (fig. 107). This description can apply to only one species and thus Favre (1939) adopted the name *Marasmius conigenus* (Pers.) sensu Pat., which should, more correctly, be cited as *M. conigenus* (Pers. ex Fr.) Karst. sensu Pat. Singer (1943) however, adopted the name *Marasmius esculentus* (Wulf.) Karst. and made a new subspecies for this fungus, *ssp. pini*. and stated that *M. conigenus* as used by Favre was synonymous with it. Later (1949) he transferred *M. esculentus* and its subspecies to the genus *Pseudohiatula*. Kühner and Romagnesi (1953) erected a new specific epithet for the taxon and called it *Collybia stephanocystis*. They cited Konrad & Maublanc (1924-1933) (T. 206, fig. 1) as an illustration of their fungus, but this is most certainly not the fungus in the sense of Patouillard or Singer, as it is clearly stated and figured as having fusoid cystidia. It seems preferable, therefore, to follow Singer (1943) and call this taxon *Marasmius esculentus* (Wulf. ex Fr.) Karst. *ssp. pini* Singer.

Very close to the preceding taxon is one that differs in having very thick walled cystidia which are also capitate, but not nearly so swollen. They are fusoid in shape and have scarcely or not at all swollen, rounded apices. Favre adopted the name *Marasmius conigenus* (Pers. ex Fr.) Karst. *ssp. esculentus* (Wulf.) Favre for this fungus and stated that it was confined to spruce cones, and never occurred on pine cones. Singer (1943) proposed for it the name *Marasmius esculentus* (Wulf. ex Fr.) Karst. *ssp. typica*. However application of the rules of botanical nomenclature required this to be changed to *M. esculentus* (Wulf. ex Fr.) Karst. *ssp. esculentus*. As stated above Singer (1949) transferred this to the genus *Pseudohiatula*. Kühner & Romagnesi (1953) apply the name *Collybia esculenta* ss. Favre and separate it in their key on its being supposedly confined to spruce cones. This is not strictly true as a collection in

Herb. Kew bears the note "on buried cones of Douglas Fir"—i.e. *Pseudotsuga taxifolia*. It is thus proposed to use the name *Marasmius esculentus* (Wulf. ex Fr.) Karst. ssp. *esculentus* for this taxon.

This leaves one species differing from the two preceding in having cystidia that are elongated, pointed at their apices which are covered by a crystalline deposit, and only slightly thickened walls. Konrad (1931) gave what is perhaps the first clear account of this species as *Collybia tenacella*. He stated that it had cystidia which were fusoid, pointed and encrusted, and refers to the coloured illustration Konrad & Maublanc (1924–1933). (T. 206 fig. 1). Favre also adopts this name in the sense of Schroeter, although how he associated his fungus definitely with that of Schroeter (1889) is not clear. Singer (1949) was non-committal regarding this species, and wrote as follows—"A third sub-species or autonomous species is known under the binomial *Marasmius tenacellus* (Pers. ex Fr.) Favre." It seems, however, advisable to retain this taxon as a distinct species under the name *Marasmius tenacellus* (Pers. ex Fr.) Favre.

The four species may be separated as follows :—

[A] Cuticle non-hymeniform. Spores amyloid.

- (1) Spores very small $3-4 \times 1.5-2\mu$. Cystidia on the gill edge small fusoid, thin walled, and non-encrusted

Baeospora myosura (Fr.) Singer

[AA] Cuticle hymeniform. Spores non-amyloid.

- (I) Cystidia always having very thick walls, encrusted, and of various shapes, but never with distinctly swollen heads or pointed apices

M. esculentus (Wulf. ex Fr.) Karst. ssp. *esculentus*

- (II) Cystidia with slightly thickened walls, heavily encrusted and always having a distinctly swollen rounded head

M. esculentus (Wulf. ex Fr.) Karst. ssp. *pini* Singer

- (III) Cystidia with thin or only slightly thickened walls, encrusted, but always pointed at the apices

M. tenacellus (Pers. ex Fr.) Favre

As this work has been concerned largely with dried specimens the following macroscopic descriptions are based on those of Favre.

***Baeospora myosura* (Fr.) Singer**

Normally a small delicate species growing in troops. Cap 10–15 mm. in diameter but exceptionally reaching 25 mm., with or without a small central umbo, and becoming plane. At first covered with a fine white felt which is very fugacious and then varying from ochraceous-fawn to dark brown, with a paler margin which becomes striate in damp weather. The gills are very crowded, thin, narrow and feebly adnate, white at first then pale ochraceous. The stipe is up to 70 mm. long by 2 mm. wide and is prolonged below into a rooting base. It is almost white above but changes to darker brown toward the base, and appears minutely hairy under a lens.

Microscopically it is characterised by its non-hymeniform cuticle and small elliptical to sub-cylindrical amyloid spores. $3-4.5 \times 1.5-2\mu$.

The cystidia on the gill edge are variable in shape, but normally somewhat fusoid being up to 40μ long and 10μ wide. (Favre— $17-35 \times 4-11\mu$).

The habitat is given by Favre as on cones of *Pinus sylvestris*, *P. montana*, *P. austriaca*, on those of *Picea*, and on the cone scales of *Cedrus*. The Kew material is usually without information regarding habitat but it has occurred on buried cones of *Pinus sylvestris* and *Cedrus* in this country.

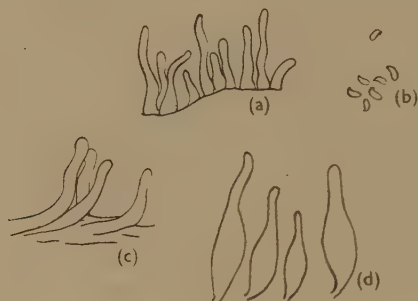


FIG. 1. *Baeospora myosura* (Fr.) Singer. (a) portion of the gill edge. ($\times 650$). (b) spores. ($\times 650$). (c) undifferentiated hairs on the stipe. ($\times 650$). (d) cheilocystidia. ($\times 650$).

The following collections are in the Kew Herbarium :—

[A] British :—

- (i) Herb. Hooker det. Klotzsch as *Agaricus esculentus* and unlocalised. [probably from the Glasgow area.]
- (ii) No. 358 det. Berkeley as *Agaricus conigenus* and unlocalised. [probably from Northamptonshire.]
- (iii) Eastbourne Dec. 1934.
- (iv) Witley Common, Surrey. 1.11.1945. Collected by A. A. Pearson, on pine cones.
- (v) Shefford, Bedfordshire, 15.10.1950. Collected by R. W. G. Dennis on buried cones of *Pinus sylvestris*.
- (vi) Royal Botanic Gardens, Kew, Surrey, 28.10.1953. Collected by D. A. Reid, under *Pinus* by tennis courts.
- (vii) Kings Langley, Hertfordshire, 8.11.1953. Collected by D. A. Reid, under *Cedrus*.

[B] Foreign.

- (i) C. Roumeguère, Fungi Gallici exsiccati. 3007, as *Agaricus* (*Collybia*) *conigenus* Pers. var. *minor* (Alb. et Schm.) Fr. A l'intérieur des écaïlles des cônes tombés des sapins. Bois de Pressac près de Toulouse. Octobre 1886 (Lambert).
- (ii) Karsten F. F. Exs. No. 212, as *Agaricus* (*Collybia*) *conigenus* Mustiala t.a. Sept.
- (iii) No. 357 det. Berkeley as *Agaricus myosurus* from Trog with the data "In pinetis montosis/ : Baumwald/Sept."

- iv Herbarium of the University of Michigan, as *Collybia conigena*. On cones of white pine. Pack Forest, Warrensburg, N.Y. Sept. 5, 1934. Collected and determined by A. H. Smith. 704.

Marasmius esculentus Wulf. ex Fr. Karst. ssp. **pini** Singer.

A more robust fungus than the preceding species. The pileus varies from 15–20 mm. in diameter, and is convexo-plane, but it may or may not have a small central umbo. The colour is variable, being normally ochraceous or ochraceous-brown, but less frequently sooty-brown or blackish-bistre and very rarely greyish-brown. The gills are more or less crowded, feebly adnate, whitish at first then pale creamy ochraceous. Stipe thin and of variable length reaching 70 mm. and prolonged below into a rooting base. This rooting portion may reach 300 mm. in length, but it does not necessarily penetrate the soil vertically, and often runs horizontally for some distance before reaching a cone. It is frequently covered by soil and plant debris which is bound into an adherent mass by the brown felt-like mycelial threads. The flesh in the cap is pale and of a mild flavour.

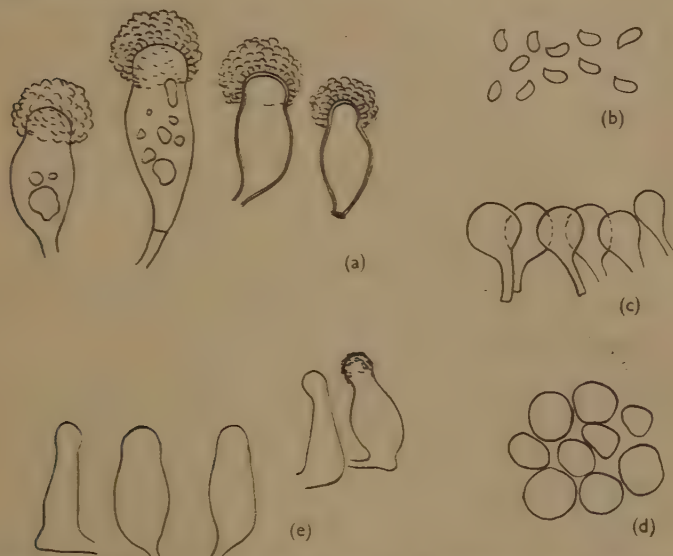


FIG. 2. *Marasmius esculentus* Wulf. ex Fr. Karst. ssp. *pini* Singer. a cheilocystidia. $\times 650$. b spores. $\times 650$. c cells of the hymeniform cuticle as seen from the side. $\times 650$. d cells of the hymeniform cuticle as seen from above. $\times 650$. (e) caulocystidia. ($\times 650$).

Microscopically this subspecies has a hymeniform cuticle, consisting of club-shaped to globose cells up to 16μ in diameter, and small elliptical non-amyloid spores $5-7 \times 3-4\mu$. It also has very characteristic pleurocystidia and cheilocystidia with distinct swollen, rounded, heads, which are covered with heavy crystalline deposits, and which have only slightly thickened walls. They are up to 57.2μ long and 23.4μ wide (Favre— $30-64 \times 11.5-24\mu$). The pileocystidia, however, are long and narrow

with slightly swollen apices, whilst the caulocystidia appear intermediate in shape between these and those on the gills. The caulocystidia may or may not be slightly encrusted, but they are thin walled, frequently very swollen and often have a distinct head. They are up to $35 \times 15\mu$.

The habitat is given by Favre as on cones of *Pinus montana*, *P. sylvestris* and *P. austriaca*, in spring. In Britain it is frequent on the cones of *Pinus sylvestris* and probably occurs on the cones of the other species where these have been planted.

The following collections are in the Kew Herbarium :—

[A] British

- (i) No. 352 det. Berkeley as *Agaricus esculentus*, from Perth.
- (ii) As *Agaricus esculentus*. On dry mossy banks at Burnham Beeches, Bucks, March 1864. Collected by G. H. Sawyer.
- (iii) Herb. F. Currey as *Agaricus esculentus* from Mr. Sawyer, April 19, 1864. [This almost certainly from Burnham Beeches].
- (iv) No. 435 det. Berkeley as *Agaricus stolonifer*. Collected by Dr. Buchanan-White [and almost certainly from Perthshire].
- (v) Herb. Berkeley, as *Agaricus conigenus*. From Aboyne W. Aberdeenshire 1862.
- (vi) Herb. Berkeley, as *Agaricus esculentus*. From Sydenham, Kent, collected by Howse 1879.
- (vii) As *Marasmius esculentus*. Among pine needles, Almond Valley, W. Lothian, opposite Cliftonhall. Collected by R. W. G. Dennis 12.5.1940.
- (viii) As *Marasmius esculentus*. On buried Scots Pine cone, Shieldaig, W. Ross. Collected by R. W. G. Dennis, 3.6.1947.
- (ix) As *Collybia conigena*. In woods of *Pinus sylvestris*, Heath and Reach, near Leighton Buzzard, Bedfordshire. Collected by D. A. Reid 1.6.1953.
- (x) As *Marasmius conigenus*. On buried cones of *Pinus sylvestris*, Heath & Reach, Bedfordshire. Collected by D. A. Reid 18.4.1953.

[B] Foreign

- (i) Sydow, Mycotheca germanica No. 2251 as *Collybia esculentus* Auf sandigen Wegen im Kiefernwald. Brandenburg : Sophienstadt bei Ruhlsdorf, Kries Nieder-Barnim. 5. 1924. Leg P. Sydow.
- (ii) Sydow, Mycotheca Marchica. No. 2501 as *Agaricus (Collybia) stolonifer*. Berlin, Jungfernheide. 5.1889. Leg P. Sydow.
- (iii) Herb. Berkeley, as *Agaricus conigenus*, Autumno ad strobilos pinorum. Bois de Boulogne.
- (iv) Karsten F. F. Exs. No. 604 as *Agaricus (Collybia) tenacellus* Mustiala. Juni 1866.
- (v) Herb. Berkeley, as *Agaricus tenacellus*, In pinetis sylvis, Bohn. Mars 1841.

Marasmius esculentus (Wulf. ex Fr.) Karst. ssp. **esculentus**.

Cap thin, 10–25 mm. in diameter (Favre states that it exceptionally reaches 44 mm.) plano-convex and with or without a small central umbo. It is usually dark blackish or greyish-brown, but occasionally paler with a margin which may become striate when moist. The gills are more or less crowded and vary from whitish to greyish in colour. Stipe long and thin, reaching up to 70 mm. or more, and prolonged below into a rooting base which is covered by soil and plant debris. It is whitish above and reddish brown toward the base and appears densely hispid under a lens especially in the upper portion. The flesh is pale in the cap and has a mild taste.

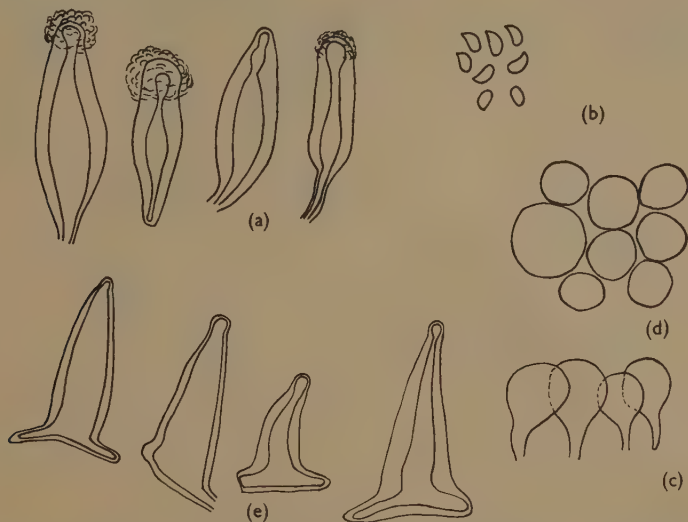


FIG. 3. *Marasmius esculentus* (Wulf. ex Fr.) Karst. ssp. *esculentus*. (a) cheilocystidia ($\times 650$). (b) spores. ($\times 650$). (c) cells of the hymeniform cuticle as seen from the side. ($\times 650$). (d) cells of the hymeniform cuticle as seen from above. ($\times 650$). (e) caulocystidia ($\times 650$).

Microscopically it has a hymeniform cuticle consisting of globose or clavate cells up to 18.2μ in diameter and small elliptical spores $5-7 \times 3-4\mu$ which are non-amyloid. The cheilocystidia and pleurocystidia are elongate, fusiform, very thick walled and with obtuse encrusted apices. They vary in shape and sometimes appear very swollen especially on the gill face, but they never have distinctly swollen heads or pointed apices. The mode of thickening is noteworthy in that the walls increase in thickness toward the apex and then thin out rapidly in the apex itself, thus enclosing a central chamber which is constricted to form a narrow canal before opening into an apical chamber. They are up to 75μ long and 22μ wide. The pilocystidia are long and narrow with slightly swollen bases, and may have small terminal heads. The caulocystidia are however much more like the cystidia on the gills. They have thick walls which thin out markedly at the apex and a rather triangular shape. They are up to 60μ and 15.6μ wide. According to Favre this

subspecies is confined to the cones of spruce and never occurs on pine cones. However it is not apparently so strictly confined, as there is a collection at Kew "on buried cone of Douglas Fir" i.e. *Pseudotsuga taxifolia*. This collection exhibits one or two minor differences from the typical condition. On the gills the cystidia are of the elongated fusoid type only, and are up to 75μ long by 15μ wide. The swollen type, normally abundant, is absent. Also the caulocystidia are much longer and narrower than those usually found and have less strongly thickened walls, and distinctly swollen heads. Indeed they closely resemble those figured by Favre. They are up to 54.6μ long and 8μ wide. It is thus very desirable to examine further collections of this subspecies, especially if it is found again on Douglas Fir, to see if these differences in the cystidia on the gills and stipe could be linked with differences in habitat.

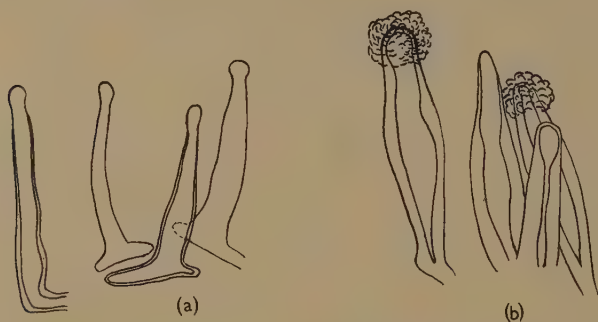


FIG. 4. *Marasmius esculentus* (Wulf. ex Fr.) Karst. *ssp. esculentus* growing on Douglas Fir. (a) caulocystidia. ($\times 650$). (b) cheilocystidia. ($\times 650$).

The following collections are in the Kew Herbarium :—

[A] British

- (i) Ex Herb. Sowerby as *Agaricus esculentus*. Without data.
- (ii) Herb. Hooker det. Klotzsch as *Agaricus esculentus*. Black-adder plantations, Berwickshire. Collected by Dr. Johnston.
- (iii) Herb. Hooker det. Klotzsch as *Agaricus esculentus*. Castle Semple, Renfrewshire, March 1831. In abietis.
- (iv) Herb. Berkeley, as *Agaricus conigenus*. Collected by the Rev. I. Ferguson. [probably in Angus].
- (v) Herb. det. Berkeley, as *Agaricus tenacellus*, Notts.
- (vi) Herb. Berkeley, as *Agaricus tenacellus*, Staunton, Notts. 1860.
- (vii) Herb. Berkeley, as *Agaricus tenacellus*. Collected by G. Broome, Dec. 1865. [probably from Batheaston].
- (ix) There is a drawing of this species on spruce cones labelled No. 353 *Agaricus tenacellus* by Berkeley from Collyweston, Northants.
- (x) As *Marasmius esculentus*, on buried cone of Douglas Fir. Norbury Park, Mickleham, Surrey. Collected by R. W. G. Dennis. 14.10.1945.

[B] Foreign

- (i) Rabenhorst Fungi Europaei. No. 801 as *Agaricus (Collybia) tenacellus*. Inter folia dejecta et ad strobilos pinuum, Apr. 1865. Legit C. Kalchbrenner.
- (ii) de Thümen, Mycotheca Universalis. No. 101 *Agaricus Collybia stolonifer*. Helvetia: Corcelles pr. Neuchâtel ad conos abietinos putridos, primo vere 1875. Leg. Dr. Morthier.

Marasmius tenacellus (Pers. ex Fr.) Favre.

Cap thin, up to 24 mm. in diameter, becoming plane and with or without a small central umbo. The colour is very variable, ranging from greyish-fuliginous to pale greyish-ochre or ochraceous. The gills are more or less crowded and feebly adnate, and range from white to greyish or rarely pale creamy-ochraceous in colour. The stipe is up to 80 mm. long and appears minutely hispid under a lens. It is prolonged below into a rooting base and is whitish above and becoming reddish-brown or ochraceous below. The flesh of the cap is more or less concolorous with external portions of the pileus and has a bitter taste.

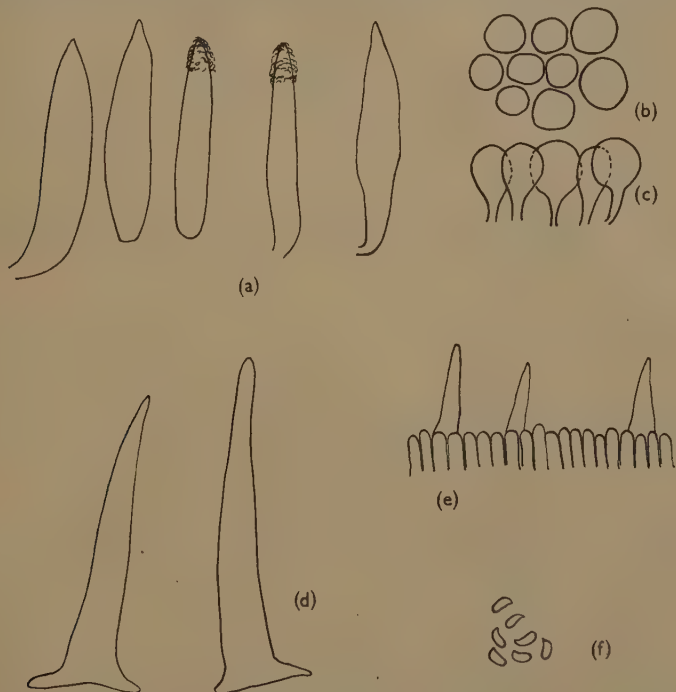


FIG. 5. *Marasmius tenacellus* (Pers. ex Fr.) Favre. (a) cheilocystidia ($\times 650$). (b) cells of the hymeniform cuticle as seen from above. ($\times 650$). (c) cells of the hymeniform cuticle as seen from the side. ($\times 650$). (d) caulocystidia. ($\times 650$). (e) portion of the gill edge. ($\times 650$). (f) spores. ($\times 650$).

This species has a hymeniform cuticle consisting of clavate or globose cells up to 16μ in diameter and small non-amyloid spores $5-7 \times 2.5-3\mu$.

The cheilocystidia and pleurocystidia are thin-walled or only slightly thickened, and encrusted, but they are always pointed at the apices. They are up to 60μ long and 13μ wide (Favre— $75 \times 13\mu$). The caulocystidia are again similar to the cystidia on the gills. They are very long, narrow, thin walled, tapering to the pointed apex, and are up to 80μ long \times 12μ wide. Favre gives the habitat as on cones of *Pinus sylvestris* and *P. austriaca* and almost never on cones of *P. montana*. The following collections are in the Kew Herbarium :—

[A] British

- (i) Herb. Berkeley, as *Agaricus* (Coll.) *conigenus*, Aboyne 1862.
- (ii) Herb. Berkeley, as *Agaricus tenacellus*, Bristol. Collected by Mr. H. O. Stephens.
- (iii) Herb. Crossland as *Collybia tenacella*. On fallen fir needles in the shrubbery, Fyling Old Hall, near Robin Hood's Bay, Yorks. May 20, 1907.
- (iv) As *Marasmius conigenus*. Under pines. Dunglass, Cockburns path, E. Lothian. Collected by R. W. G. Dennis, 31.5.1942.
- (v) As *Marasmius esculentus*. On buried cones of *Pinus sylvestris* in sandy soil, Munstead, Godalming, Surrey. Collected by R. W. G. Dennis. 11.5.1947.
- (vi) As *Marasmius esculentus* on coniferous debris (apparently not on cones) Kinloch, Isle of Rhum. Collected by R. W. G. Dennis 17.7.1951.
- (vii) As *Collybia tenacella*. On buried fir cone. Ashridge, Hertfordshire. Collected by D. A. Reid 9.5.1952.

In conclusion it can be stated that Favre's work on the Swiss Collybioid agarics growing on coniferous cones has been found to apply to the material in the Kew Herbarium, and that all four species occurring in that country have been found in Britain.

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SOME INOPERCULATE DISCOMYCETES OF TROPICAL AMERICA.

R. W. G. DENNIS.

During the autumn and winter of 1949 the writer made a number of Discomycete collections in Trinidad, Venezuela and Jamaica. In attempting to name these it has been found necessary to reexamine the whole of Wright's material from Cuba, on which Berkeley and Curtis based about a dozen names of inoperculates and also authentic material of a number of other discomycetes described from the American tropics by subsequent authors. Very few of these have ever been figured nor, as a rule, is there sufficient description of their anatomy in the published diagnoses for the species to be allotted places in the modern classification. Hence it is hoped that the drawings, uniformly arranged descriptions and keys offered below will form a basis from which the study of West Indian inoperculates can be begun.

To those familiar with European fungi the most remarkable feature of the tropical American flora is the paucity of Dermateaceae. Several Brazilian collections not seen by me have been described in *Dermatea* by continental authors but Groves (1946) thought none likely to have been correctly so referred. Cash (1937) recorded an unnamed species of *Pezicula* among Martin's material from the Colombian Andes but there and in Panama he apparently secured only one *Belonopsis* and one *Mollisia*. The writer saw nothing referable to either of these or to *Pyrenopeziza* in tropical America in 1949.

Another remarkable feature is the predominance of acicular spores among the species of Hyaloscyphaceae. Of the 66 British species of *Dasyyscypha* or *Trichoscyphella* only 3 or about 5% have spores appreciably over 20 μ long but of the 19 species of *Dasyyscypha* described below 12 or 60% have acicular or long fusiform spores. This spore type does not appear to be correlated with any particular substrate and its biological significance is unknown.

The total number of species of inoperculate discomycetes recorded from tropical America is very small and though this may be partly attributable to the smaller and more inconspicuous kinds being overlooked by collectors, few of whom have been mycologists, it seems likely it is largely due to the tendency for fungi of this kind to become lichenised being even stronger there than in temperate regions. It is, in practice, difficult to distinguish between lichenised and nonlichenised species, especially in the Lecanorales where, for example, *Karschia* is merely *Buellia* without associated algal cells. Clearly the study of inoperculate Discomycetes and Discolichenes should be undertaken together.

Most collections from tropical America have been named according to Saccardo's system based largely on ascospore septation. Unfortunately this is often an inconstant and unreliable character and an attempt has been made below to redispense the species in Nannfeldt's (1932) system, based primarily on hyphal structure.

A few of the old species, notably "*Erinella*" *bicolor* and "*Belonium*" *rimosum*, cannot be assigned satisfactorily to any genus known to the writer. Their probable affinities are discussed below but it has been

thought best to defer erecting new monotypic genera for their reception. Neither is of economic importance or likely to be often cited in the near future and it may be hoped that they will be rediscovered and studied in the fresh condition, preferably with reference to possible conidial states. One Trinidad collection for which no published name has been found has been made the basis of a new monotypic genus, *Orbiliaster*. Its structure suggests reference to Orbiliaceae rather than Hyaloscyphaceae, in spite of the presence of marginal hairs, and its simple paraphyses exclude it from *Orbilia*.

- I. Asci thickwalled, especially at the tip, outer wall ruptured at about one third of the way down on dehiscence (Bitunicate)

Patellaria (Lecanorales)

- II. Asci thinwalled, with an apical pore through which the spores are ejected :

- A. Ascoma clubshaped, stipitate, spores elongated, usually multi-septate, West Indian species black Geoglossaceae

- B. Ascoma cupshaped or disc-like, short-stalked or sessile :

1. Asci very long, cylindrical, capitate, spores filiform . . Ostropales
2. Asci shorter, less than 150μ long as a rule, more or less clavate, apex often somewhat pointed with a conspicuous rather broad pore, often closed by a plug which stains blue in Iodine (best in Melzer's reagent) :

- a. Apothecia dark olive to black, soft, sessile, hymenium \pm gelatinous, its mucilage stained blue by Iodine or the apex of the ascus so stained (not in *Catinella*), paraphyses often cemented into a brown epithecium, spores often brown

Lecanorales

- b. Apothecia usually light coloured, if dark brown or blackish then usually with a well defined stalk or the spores hyaline, hymenium not gelatinous or if so the mucilage is not stained blue by Iodine and lacks an epithecium . . Helotiales

- *Apothecia sessile, waxy, asci and paraphyses firmly united, the latter usually knobshaped, asci usually less than 40μ long, spores minute Orbiliaceae

- **Apothecia fleshy or coriaceous, paraphyses cylindrical or lanceolate :

- †Apothecia clothed with long hairs, often encrusted with minute colourless granules . . . Hyaloscyphaceae

- ††Apothecia smooth, furfuraceous or at most pruinously downy :

- ‡Excipulum a pseudoparenchyma of \pm isodiametric cells, or appearing so in radial section :

- §Apothecia sessile, soft, mostly dark olive-brown or black
Dermateaceae

- §§Apothecia usually stalked, tough, coriaceous, rhubarb-colour or dark brown . Helotiaceae Encoelioidaeae

- ‡‡Excipulum prosenchymatous . . . Helotiaceae

OSTROPALES

I have seen no material referable to this order from the Caribbean region though the following two species described on bark from Apiahy, São Paulo, Brasil, should probably be transferred to *Apostemidium* viz. *Gorgoniceps leucophaeus* Speg. and *Godronia splendida* Speg.



FIG. 1. *Erinella bicolor*. Apothecium $\times 13$, ascus, paraphysis, spore and surface view of excipulum $\times 660$.

The structure of its asci suggests that the following Andean species might be placed here :

Erinella bicolor Pat. et Lagerh. in Bull. Herb. Boissier 3, 65 (1895).

Apothecia scattered on under surface of leaves ; disc orange, about 300μ diam. ; receptacle cupshaped, sessile on a small base, very soft and covered by irregular, white granules, unaffected by lactophenol or KOH solution. Excipulum apparently composed of rather small, thinwalled, prismatic hyaline cells, apparently without hairs and with a smooth margin ; asci cylindrical, $95-125 \times 5-6\mu$, rounded above, where the wall is $3-4\mu$ thick and perforated by a narrow canal unstained in Melzer's reagent ; ascospores filiform, about $80 \times 1-1.5\mu$, multiseptate ; paraphyses filiform, 1μ thick, branched. On leaves, probably of *Sloania macrophylla*, Vide Dr. Rollins.

Ecuador, San Jorge, July 1892, Leg. Lagerheim. Fig. 1.

The peculiar structure of the asci was noted by the authors who commented, " L'extrémité supérieure des thèques est capitée comme dans les *Cordyceps* ". In this and in its branched paraphyses the fungus is quite out of place in *Erinella* = *Dasyscypha* and agrees with the Ostropales. Apart from the superficial habit there is a remarkable resemblance to

Stictis. Its disposition depends on the significance attached to the ascus structure. If this be of paramount importance then a new genus is required to accommodate it in Ostropales though one might shrink from founding one on the very scanty material now remaining in Herb. Farlow. It is not even known if the fungus is a parasite or a saprophyte. On the other hand, habit, colouring and apothecial structure are reminiscent of Helotiaceae in the vicinity of *Pseudohelotium*.

HELOTIALES

DERMATIACEAE

- A. Receptacle light-coloured *Coronellaria*
 B. Receptacle almost black :
 1. Ascospores 0-1-septate *Mollisia*
 2. Ascospores more than 1-septate *Belonopsis*

Coronellaria Karst. in Not. Sallsk. Fl. F. Fenn. **2**, 248 (1871).

Coronellaria musicola (Speg.) Dennis comb. nov.

Helotium musicola Speg. in An. Mus. Nac. Buenos Aires **19**, 446 (1909).

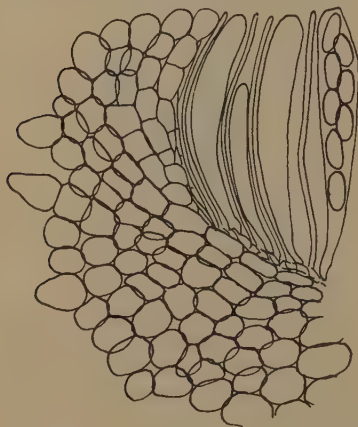


FIG. 2. *Coronellaria musicola*, radial section $\times 660$.

Apothecia scattered on grayish patches of lamina or petiole, superficial ; disc about $\frac{1}{2}$ mm. diam., flat, ash coloured ; receptacle saucer-shaped with a thick and prominent margin, sessile, soft, light brown, minutely pruinose. Excipulum formed of a thinwalled pseudoparenchyma with cells $5-10\mu$ diam., those at the surface globose or pyriform, protruding ; asci clavate, with a broad apical pore not blued by Melzer's reagent, 8-spored, $60 \times 9\mu$ (up to $65 \times 14\mu$ when fresh) ; ascospores irregularly biseriate, broadly elliptical, $9-11 \times 4\mu$ ($10-12 \times 5-6\mu$ when fresh) ; paraphyses cylindrical, 2μ thick, obtuse. On *Musa paradisiaca*. Fig. 2.

Collection seen : Argentina, Oran, *Jujuy*, March 1905, Typus in Herb. Eva Peron

The rather light coloured soft apothecia, the occurrence on a monocotyledonous host and broadly elliptical spores induce one to refer the species to *Coronellaria* rather than to *Mollisia*. The peculiar Iodine reaction of the former genus is not now apparent though Spegazzini wrote "Jodi ope nulla v. membrana ascorum perdilute coerulescens." This inconspicuous little fungus would be very easily overlooked and should be sought on bananas in the West Indies.

Cash (1937) reported the common north temperate *Mollisia cinerea* (Batsch ex Fr.) Karst. from Panama. *Belonium rimosum*, see Helotiaceae, might also be sought here.

***Belonopsis* Rehm** in Rabenhorst, Krypt. Flora I (3) p. 571, 1891.

***Belonopsis aciculispora* Cash** in Iowa Studies Nat. Hist. 17 p. 214, 1937.

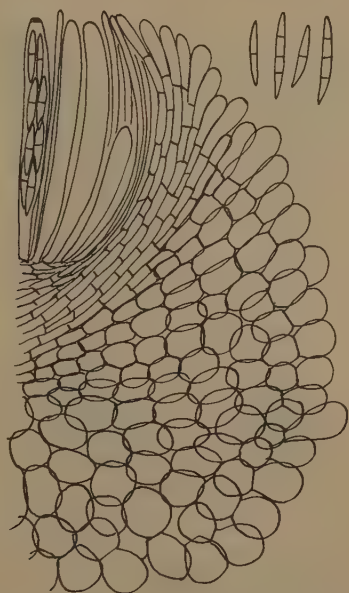


FIG. 3. *Belonopsis aciculispora*, radial section and free spores $\times 660$.

Apothecia sessile, superficial, saucershaped on a broad base, disc flat, yellowish about 1 mm. diam., margin dark brown, prominent and in-rolled when dry, receptacle almost black, smooth. Excipulum formed of almost isodiametric cells up to 10μ diam., with thin dark brown walls, becoming elongated and cylindrical towards the margin, firmly attached to the bark by numerous hyaline anchoring hyphae about 3μ diameter; asci about $55 \times 5\mu$, the rather broad pore deep blue in Melzer's reagent, 8-spored; ascospores narrowly fusiform, 1-septate, $10-15 \times 1.5-2\mu$, occasionally 3-septate, $20 \times 2\mu$; paraphyses cylindrical, rounded above, 1.5μ diameter, hyaline. Fig. 3.

Collection seen: Panama, on unnamed twigs at 1600–1800 m., Prov. Chiriqui, 29.VI.1935, *Martin* 2125, Typus.

Pezicula majuscula Speg., from Tucuman, Argentina, is operculate. The remaining material is in poor condition but is clearly referable to *Phillipsia*. *Pezicula guttiformis* Speg., with minute superficial apothecia on *Galium* leaves in south Brasil, is certainly no *Pezicula* and is probably Helotiaceous rather than Dermateaceous.

ORBILIACEAE

- A. Paraphyses simple, apothecial margin ciliate . . . *Orbiliaster*
 B. Paraphyses capitate, apothecial margin even or crenate . . . *Orbilina*

Orbiliaster Dennis.

Apothecia sessilia, concava, superficialia; margine ciliato; sporidia oblonga, hyalina; paraphysibus filibormibus.

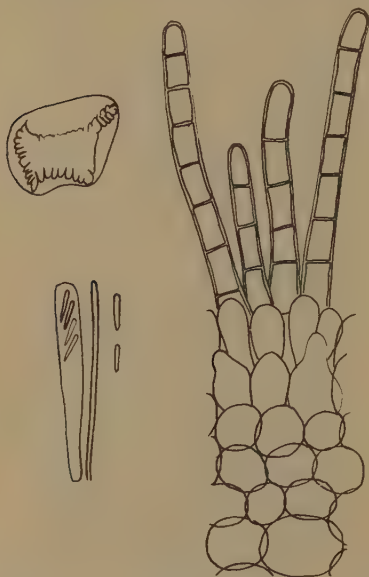


FIG. 4. *Orbiliaster pilosa*. Dry apothecium $\times 10$, ascus, paraphysis and spores $\times 1000$, margin of apothecium in surface view $\times 500$.

Orbiliaster pilosa Dennis spec. nov.

Sessilis, concaviuscula, argillacea, pellucida, 1–2 mm. diam.; contextu excipuli parenchymatico, cellulis $30\text{--}40\mu$; margine ciliato, incurvato; pilis $60\text{--}110 \times 5\text{--}8\mu$, obtusis, hyalinis, septatis; ascis claviformibus, octosporis, coalescentibus, $30 \times 4\mu$; sporidiis bacillaribus, rectis, $5 \times 0.5\mu$; paraphysibus filiformibus. Hab. in truncis putridis, in Trinidad, River Estate, Diego Martin, 22.IX.1949, Dennis 30, Typus. Fig. 4.

Orbilina andina Pat. (Fig. 6 H) was described with very similar hairs from Chusquea stems and logs in Ecuador but in it the "hairs" are not marginal but clothe the lower part of the excipulum and are in fact hyaline anchoring hyphae. In different collections so referred by Patouillard the ascospores were measured by him as $5\text{--}7 \times 1\mu$ and $13 \times 1\mu$. He also recognised a var *lateritia* Pat. with spores $5 \times 1\mu$ which may be *O. juruensis*.

Orbilina Fr. Flor. Scan. p. 343, 1835.

The species of *Orbiliaceae* reported from the Caribbean region may be distinguished as follows :

- A. Apothecial margin fringed with hyaline setae . . . *Orbiliaster pilosa*
- B. Apothecial margin even or very minutely crenulate :
 - I. Apothecia pure white, up to 5 mm. across, on Aroids . *Orbilina alba*
 - II. Apothecia not more than 3 mm. across, on wood or bark :
 - a. Apothecia pink or red :
 - 1. Ascospores $5-7 \times 1\mu$ *O. juruensis*
 - 2. Ascospores $11-16 \times 1-1.5\mu$ *O. vinosa*
 - b. Apothecia whitish, yellowish or clay coloured :
 - 1. Margin minutely crenulate, disc clay coloured . *O. lancicula*
 - 2. Margin even :
 - *Ascospores $3-4.5 \times 0.5\mu$ *O. epipora*
 - **Ascospores flexuose, $8-10 \times 0.3\mu$. *O. curvatispora* var *minor*

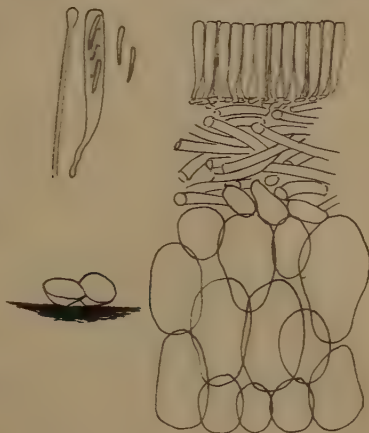


FIG. 5. *Orbilina alba*. Two apothecia natural size, ascus, paraphysis and spores $\times 1000$, section of disc $\times 500$.

Orbilina alba Dennis spec. nov.

Apothecia gregaria, superficialia, sessilia, concava, pellucida, alba, 5 mm. lata, excipulo parenchymatico praedita, hyalina. Asci clavati, obtusi, $28 \times 3\mu$. Ascosporae octonae, hyalinae, continuae, $5-6 \times 0.5\mu$. Paraphyses filiformes, capitatae.

Hab. in caulibus vivis Aroideae terrestres, Cerro del Aripo, Trinidad, 23.X.1949, Dennis 483, Typus. Fig. 5.

The excipulum contains 2-3 layers of thinwalled, elliptical, hyaline cells, up to $40 \times 20\mu$ apparently overlain by a thin gelatinous surface layer, about 10μ thick containing a few slender hyphae. If this belongs to the fungus it is an unfamiliar character in *Orbilina*.

Of the described species this seems nearest to *O. sinuosa* Penz. & Sacc., said to be up to 3 mm. diameter, cream, diaphanous, on wood in Java. In addition to the different habitat *O. sinuosa* apparently differs in its broader asci, $28-35 \times 4-5\mu$ and less slender spores $4-6 \times 1\mu$.

Orbilia lancicula (Mont.) Pat. & Gaill. in Bull. Soc. myc. France **4**, 99 (1889).

Under this name Patouillard described a fungus he interpreted as the old *Hirneola lancicula* Mont., originally from Cayenne. He says he compared his collections with the typus, preserved in the Natural History Museum, Paris, but nothing can now be found there under Montagne's name. According to Patouillard this is common corticolous *Orbilia* of Guadeloupe, Martinique and the Orinoco.

His material from the Antilles, now in the Farlow herbarium, has apothecia 1.2 mm. across, yellowish-brown, of the usual *Orbilia* shape and structure, with a distinct minute crenulation of the margin but no hairs or setae. The asci measure $30-35 \times 3\mu$, with filiform paraphyses, but no spores can be found. Patouillard was also unable to discover the spores. The reputedly common species should be sought and studied fresh in the West Indies.

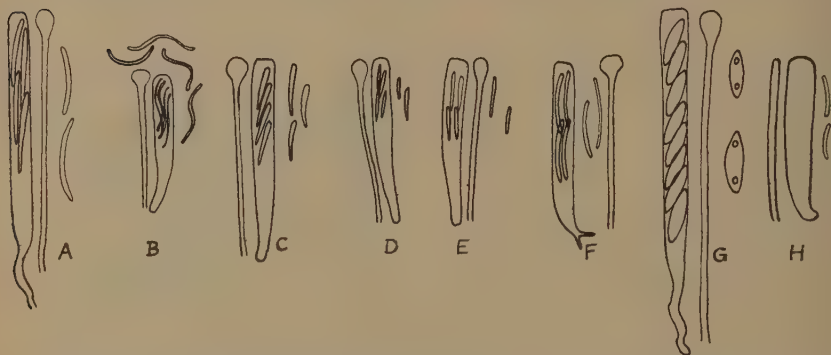


FIG. 6. Asci, paraphyses and spores of *Orbilia* spp. reported from tropical America, all $\times 1000$. A from Wright 371, B *Orbilia curvatispora* var. *minor*, C *Orbilia juruensis*, D *Orbilia epipora* from Karsten's Fungi fenn. 725, E from Wright 355, F *Orbilia tenuissima*, G "*Helotium*" *marmolense*, H *Orbilia andina*.

***Orbilia curvatispora* Boud. var. *minor* Dennis var. nov.**

Apothecia gregarious, on decorticated wood. Disc concave, cream, up to 400μ across; receptacle very thin, translucent, smooth, concolorous, attached by a small base. Excipulum a pseudoparenchyma of rounded thinwalled cells about $10-15\mu$ across, smaller towards the margin. Asci cylindric-clavate, about $20 \times 3\mu$; ascospores filiform, curved, $8-10 \times$ about 0.3μ , paraphyses slender, enlarged to 3μ at the tip.

Trinidad: on log, River Estate, Diego Martin, 13.1.1921, E. M. Wakefield 173, Typus Fig. 6 B. A typo apotheciis minutis et sporidiis $8-10 \times 0.3\mu$ recedit.

Boudier's species differs only in being larger in all parts, with asci 40μ long and ascospores $15 \times 1\mu$. *O. tenuissima* Speg. on petioles of *Pothos* in Paraguay, has yellowish apothecia, asci $30 \times 3-4\mu$ and ascospores only slightly curved, $8-10 \times 0.5\mu$. Fig. 6 F.

***Orbilia epipora* (Nyl.) Karst.** in Not. Sällsk. Faun. Flora Fenn. 11, p. 248, 1871.

Peziza epipora Nyl. in Not. Sallsk. Faun. Flora Fenn. 10, p. 58, 1869.

This differs from the preceding in its very minute ascospores, $3-4.5 \times 0.5\mu$, straight or slightly curved. Fig. 6 D. Cash (1937) has recorded it on wood in Panama. Wright 355 from Cuba, published by Berkeley & Curtis as *Peziza vulgaris* Fr., which modern authors interpret quite differently, is an *Orbilium* with rod-shaped ascospores $4-5 (-6) \times 0.3\mu$ and probably belongs here or to the subspecies *inflatum* Karst. Fig. 6 E.

Orbilium juruensis P. Henn. in Hedwigia 43, 270 (1904).

This is a large red ("incarnato-coccineis") species, 2-3 mm. across, with distinctly clavate ascospores $5-7 \times 1\mu$. It was described from Amazonas and has been subsequently reported by Cash from Panama. Fig. 6 C.

Orbilium gaillardii Sacc., Syll. Fung. 8, 629 (1889) from wood in Venezuela, was described as orange, with apothecia 1 mm. across and subglobose ascospores $0.3-0.5\mu$ diameter.

Berkeley & Curtis referred three of Wright's Cuban collections to ***Orbilium vinosa*** (Fr.) Karst. Of these Wright 631 bears the field note "bright orange" and is not an *Orbilium*. Numbers 628 and 371 appear to represent a single species, a typical *Orbilium* 1 mm. or more across, with knob-shaped paraphyses and slightly curved ascospores $9-12 \times 0.5-1\mu$ in asci $40-50\mu$ long. Fig. 6 A. The apothecia are now pallid to ochraceous but in Curtis' manuscript 371 is said to have been red. European material interpreted as *O. vinosa* has longer ascospores, $11-16 \times 1-1.5\mu$ and further collections with adequate field notes are obviously desirable to confirm the presence of the species in the West Indies. Seaver (1951) recorded a fungus with similar ascospores from Bermuda and Porto Rico under the name *Orbilium chrysocoma* (Bull.) Sacc. Bulliard's figure does indeed resemble an *Orbilium* but it is impossible to say which species he had and the fungus distributed by Fries as *Peziza chrysocoma* Bull. in Scleromyceti Sueciae 331 is *Dacrymyces stillatus* Fr. It is therefore unwise to attempt to attach the epithet *chrysocoma* Bull. ex Fr. to a species of *Orbilium*.

The name *Calloria citrina* A. L. Smith appears to have originated in confusion from a mixture of a bright yellow *Orbilium* with *Coryne sarcoides* and *Ombrophila microspora*.

HYALOSCYPHACEAE

- A. Apothecia clothed with septate hairs, their walls covered with inorganic granules except in *Dasyscypha andina* . . . *Dasyscypha*
- B. Apothecia minute, clothed with short, smooth, nonseptate, usually pointed hairs *Hyaloscypha*

Dasyscypha Fuckel in Jahrb. Nass. Ver. Nat. 304 (1870).

The generic name *Dasyscyphella* Tranzschel 1899 has been rather generally adopted for a somewhat homogeneous group of tropical Hyaloscyphaceae, found on angiospermous bark, with rather massive sessile apothecia clothed with white or buff granulate hairs around a deep yellow or orange disc. All have narrow fusiform spores and the

paraphyses are not broadly lanceolate. The type species, *D. cassandrae* Tranz. on dead stems of *Cassandra calyculata* Don in Russia, is unknown to me and has not been studied since its original publication but, as commonly conceived, the genus seems to correspond on angiosperms to *Trichoscyphella* Nannf. on gymnosperms. Unfortunately I am quite unable to draw a satisfactory distinction between this "*Dasyscyphella*" group of species and others clearly inseparable from *Dasyscypha*. Hence, regrettably, it has been necessary here to unite the two genera and in so doing to add several more to the 350 or so epithets already combined in *Dasyscypha*.

Those familiar with the prolonged controversy and confusion over the circumscription of species in *Trichoscyphella* will not be surprised to encounter some difficulty in defining the comparable tropical species, known as many of them are by single collections from unnamed bark. In the following treatment I have tried to place together morphologically similar collections but the extensive synonymy proposed for some species must be regarded as tentative and subject to correction when adequate data regarding host range and cultural characters become available.

With European Hyaloscyphaceae it is a common experience that species white fleshed and white haired in the field become more or less brown or flesh coloured in the herbarium. As most of the fungi described below are known only from dried material, much of it now of considerable age, mycologists in tropical America must bear in mind the possibility that some species described as brown or brown haired may be white when found in the field. For this reason more reliance should be placed on the precise shape of hairs and spores than on colour.

Key to the tropical American species studied.

1. On bark, twigs or other woody substrata including bamboo culms (see also *D. virginea*) :
 - I. Spores rather short and broad, up to $30 \times 3\mu$, conspicuously 3-septate :
 - A. Stalk blackened at the base *Belonidium sclerotii*
 - B. Stalk white throughout or almost absent . . . *D. subcorticalis*
 - II. Spores more slender and usually much longer :
 - A. Hairs browning with age :
 - α . Paraphyses lanceolate *D. avellaneo mellea*
 - β . Paraphyses filiform :
 - a. Spores fusiform, multiguttulate, $2-2.5\mu$ wide . . *D. bambusina*
 - b. Spores filiform, multiseptate, $1-1.5\mu$ wide . . *D. schroeteriana*
 - B. Hairs persistently white, paraphyses filiform or very narrowly lanceolate :
 - α . Spores $75-130 \times 3\mu$ *D. calospora*
 - β . Spores less than 60μ long :
 - a. Spores very slender, $40-45 \times 1\mu$, asci up to 70μ long
D. martini

b. Spores broader, more fusiform, asci longer :

*Spores $35-58 \times 2.5-3\mu$ nonseptate, asci over 100μ long

D. raphidophora

** Spores $27-53 \times 1.5-2.5\mu$, sometimes 1-3-septate, asci seldom more than 100μ long . . . *D. brasiliensis*

γ . Spores less than 5μ long, asci less than 50μ long . *D. inspersa*

C. Hairs containing yellowish oil, distinctly clavate, paraphyses broadly lanceolate *D. dussii*

2. On herbaceous stems, small grass culms, ferns or dead leaves :

I. Hairs conspicuously tapering, walls reddish-brown in dried material, spores $35-47 \times 2-2.5\mu$ *D. orinocensis*

II. Hairs white, rough, apices obtusely rounded :

A. Spores very long, narrow and flexuous :

α . On stems, asci over 100μ long *D. lasseri*

β . On dead leaves, asci $50-60\mu$ long *D. mapiriana*

B. Spores elliptical to fusiform, less than 30μ long :

α . Spores $25-30 \times 2-3\mu$, on fern stems . . . *D. fimbriifera*

β . Spores less than 20μ long :

a. Apothecia sessile :

* Apothecia white, spores $8-12 \times 2-2.5\mu$, on *Cyperaceae*

D. uleana

** Apothecia bright red with white hairs, spores $15-18 \times 2-2.5\mu$, on living fern fronds (*Gleichenia*, *Dicranopteris*)

D. ulei

b. Apothecia long-stalked, spores $6-10 \times 1.5-2\mu$:

* Apothecia light yellow throughout, paraphyses narrowly lanceolate, on stems *D. varians*

** Apothecia white or only the disc faintly cream coloured, paraphyses broadly lanceolate, on any vegetable debris

D. virginea

III. Hairs white, smooth, sharp-pointed, spores 3-septate, $28-30 \times 4\mu$, on herbaceous stems *D. andina*

***Dasyscypha subcorticalis* (Pat.) Dennis, comb. nov.**

Erinella subcorticalis Pat. apud Duss, Champ. Guadeloupe, 67 (1903)1

Dasyscyphella subcorticalis (Pat.) Cash in Mycologia 35, 601 (1943).

Apothecia scattered on bark or decorticated wood, disc orange, 1 mm. diam., receptacle cupshaped, sessile on a small base, clothed with white hairs. Hairs up to about $110 \times 4-5\mu$, thinwalled, hyaline, multiseptate, apices rounded, not enlarged, walls finely granulate; asci $70-100 \times 8-9\mu$, 8-spored, pore deep blue in Melzer's reagent; ascospores 2-3-seriate, narrowly fusiform or slightly inaequilateral, pointed at each end, 3-septate, $25-30 \times 2-3\mu$; paraphyses narrowly lanceolate, $2-3\mu$ thick. On rotting branches. Fig. 7.

Collections seen : Guadeloupe, Bois des Bains-Jaunes, *Duss* 509, Typus in Herb. Farlow. Cuba, *Wright* 365, published by Berkeley & Curtis (1868) as *Peziza corticalis* Pers. Also reported by Cash from Florida.

The type collection, *Duss* 1240, of *Erinella cyphelloidea* Pat. may be immature material of the above species but is in too poor condition for precise determination. *Belonidium sclerotii* A. L. Smith 1901 may be an earlier name for *D. subcorticalis* but the available material is too scanty for a final opinion. Its type collection, Elliott 1367, Dominica, Jan. 1896, differs from *Duss*' and *Wright*'s in having a very short dark brown stalk ; the ascospores are 3-septate, $27-34 \times 2-3\mu$. Until more collections are available from the West Indies and some information is provided about their substrata one cannot judge the importance to be attached to the presence of a blackish base to some apothecia.

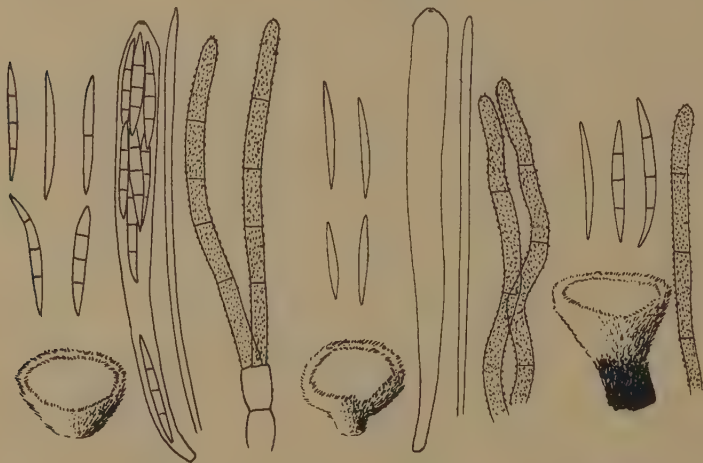


FIG. 7. Left : *Dasyscypha subcorticalis* from *Duss* 509 ; Centre : *Erinella cyphelloidea* from *Duss* 1240 ; Right : *Belonidium sclerotii* from Elliott 1367. Apothecia $\times 15$, spores, asci, paraphyses and hairs $\times 660$.

***Dasyscypha avellaneo-mellea* (Starb.) Dennis, comb. nov.**

Erinella avellaneo-mellea Starb. in Bih. K. Svensk. Vet.-Akad. Handl. 25, Afd. 3, no. 1, 6 (1899).

Erinella heterotricha Speg. in Bol. Acad. Nac. Cienc. Cordoba, 149 (1919).

Apothecia scattered on bark, disc light yellow, 1 mm. diam., receptacle cupshaped on a small base, densely clothed with light brown hairs. Hairs up to $140 \times 3-4\mu$, rather closely septate, with thin, light brown, finely granulate walls, apical cell usually tapering to a rounded point ; asci $90-100 \times 8-9\mu$, 8-spored, the small pore blue in Melzer's reagent ; ascospores parallel, very narrowly fusiform, $45-60 \times 1-2\mu$, becoming 7-septate ; paraphyses longer than the asci, lanceolate, $2.5-4\mu$ wide. On bark of trees. Fig. 8.

Collections seen : Brasil, Rio Grande do Sul, Cascata de Hermenegilda pr. Pelotas, *Malme* 107, 12.XII.1892 (Typus) ; Saõ Paulo, Apiahy, *J. Puiggari* 19 (Typus of *E. heterotricha*).

Dasyscypha bambusina* (Bres.) Dennis, comb. nov.Erinella bambusina* Bres. in Hedwigia **35**, 296 (1896).*Dasyscyphella appressa* Cash in Iowa Studies Nat. Hist. **17**, 217 (1937).*Erinellina appressa* (Cash) Seaver N. Amer. Cup Fungi, Inoperculates, 292 (1951).

Apothecia scattered, superficial, disc light brown, 1–1.5 mm. diam., receptacle cupshaped with a well defined slender stalk, light brown, densely clothed with long brown hairs. Hairs slightly curved or undulating, $120\text{--}170 \times 3\text{--}4\mu$, tapering slightly towards the rounded tip, multiseptate, walls thin, brown, finely granulate; asci $90\text{--}105 \times 7\text{--}9\mu$, 8-spored, pore blue in Melzer's reagent; ascospores subparallel, narrowly fusiform, sometimes slightly curved or slightly more attenuated and curved below, conspicuously multiguttulate, $40\text{--}50 \times 2\text{--}3\mu$; paraphyses cylindrical or slightly enlarged upwards, $1.5\text{--}2.5\mu$ thick, not pointed. Fig. 9.

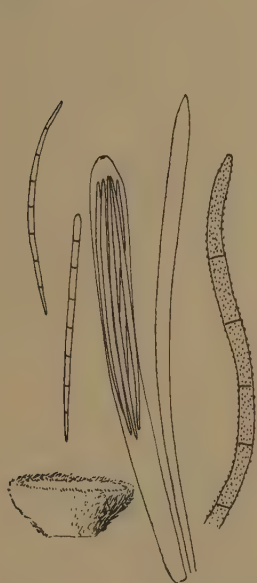


FIG. 8. *Dasyscypha avellaneo-mellea*. Apothecium $\times 15$, spores, ascus, paraphysis and hair $\times 660$.

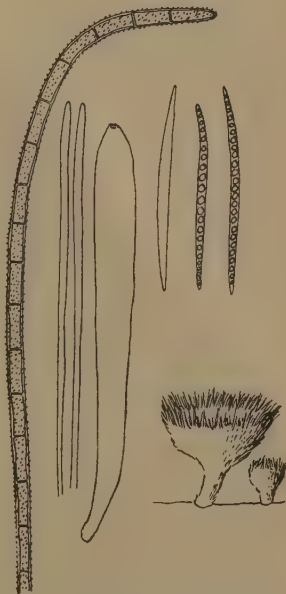


FIG. 9. *Dasyscypha bambusina*. Apothecium $\times 15$, hair, paraphyses, ascus and spores $\times 660$, from Moller 45a.

Collections seen: Brasil, Santa Catharina, Blumenau, on bamboo culms, Moller 45a (Typus). Panama, Prov. Chiriqui, 9.VII.1935 G. W. Martin 2672, authentic for *D. appressa*.

Dasyscypha schroeteriana* (Rehm) Dennis, comb. nov.Dasyscyphella schroeteriana* Rehm in Hedwigia **39**, 95 (1900).

Apothecia scattered on bark, disc light brown, about 1 mm. diam., receptacle shallow cupshaped with a short stemlike base, light brown with

a white margin, clothed with light brown hairs. Hairs undulating, up to $125 \times 3-5\mu$, cylindrical with rounded tips, septate, wall thin, light brown, rather coarsely granulate; asci $80-90 \times 9\mu$, pore minute, rather feebly blue in Melzer's reagent, 8-spored; ascospores parallel, narrowly fusiform, slightly curved or undulating, becoming 7-septate, $50-55 \times 1.5\mu$; paraphyses cylindrical, rounded above, 2μ thick. On dead branches.

Collection seen: Brasil, Orlegno, *Ule* 1569, portion in Herb. Sydow, Stockholm. Fig. 10.

This is very near *Peziza simillima* Berk. et Br. from Ceylon, the type species of Seaver's redundant genus *Erinellina*, which differs, if at all, in its shorter whiter hairs. In view of its persistent white margin it would not be surprising if *D. schroeteriana* proved to be white haired and white fleshed when fresh.



FIG. 10. *Dasyscypha schroeteriana*. Apothecium $\times 15$, spore, paraphysis, ascus and hair $\times 660$.

***Dasyscypha calospora* (Pat. et Gaill.) Dennis, comb. nov.**

Erinella calospora Pat. et Gaill. in Bull. Soc. myc. France **4**, 101 (1889).

Erinellina calospora (Pat. et Gaill.) Seaver N. Amer. Cup Fungi, Inoperculates, 291 (1951).

Apothecia scattered on bark, disc light orange, flat, 2-3 mm. diam., receptacle saucers shaped with a short stemlike base, whitish, clothed with short white hairs. Hairs undulating up to $100 \times 4\mu$, slightly enlarged upwards, obtusely rounded at the tip, with thin hyaline granulate walls and rather distant septa; asci $125 \times 15\mu$, the small pore blue in Melzer's reagent; ascospores parallel, $75-130 \times 3\mu$, fusiform, slightly curved, appearing 1-septate in Melzer but not clearly so in cotton blue; paraphyses numerous, cylindrical with pointed tips and granular contents, no longer than the asci. On bark of living trees. Fig. 11.

Collections seen: Venezuela, Rio Orinoco between Maipures and San Fernando, 26.VII.1887, Gaillard 248, in Herb. Farlow. Cuba, Wright 653, published by Berkeley & Curtis as *Peziza corticalis* Pers.

The type material of *Dasyscypha patena* (Lév.) Sacc., viz. Lindig 888 from Bogotá, Colombia, now at Paris, differs from *D. calospora* only in its more slender slightly shorter spores, $80-90 \times 1-2\mu$. The remaining apothecia are small, less than 1 mm. diam. whereas Lévillé described them as 2-3 mm. diam., hence it seems possible the material seen is immature *D. calospora*. If so Lévillé's specific epithet has priority as it dates from 1863, but it is equally possible that there are in fact two good species of *Dasyscypha* in tropical America, differing only in the size of their long slender parallel spores. Which hypothesis is correct can only be shown by the examination of more representative collections.

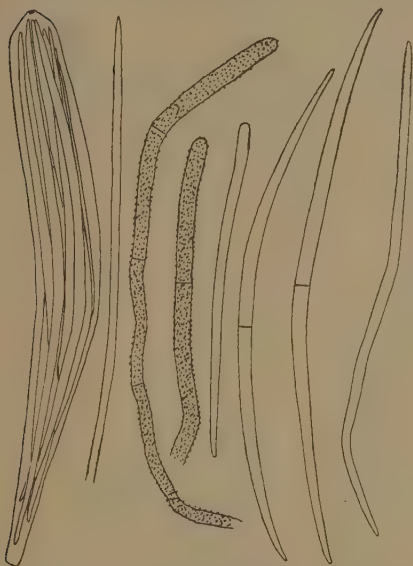


FIG. 11. *Dasyscypha calospora*. Ascus, paraphysis, hairs and spores $\times 660$. Spore on extreme right from Wright 653, remainder from Gaillard 248.

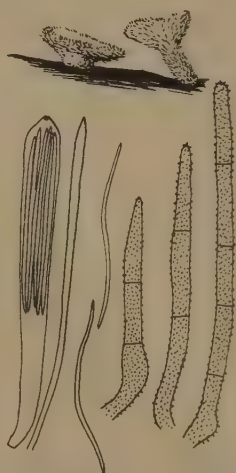


FIG. 12. *Dasyscypha martini*. Apothecia $\times 15$, ascus, paraphysis, spores and hairs $\times 660$.

***Dasyscypha martini* Dennis, nom. nov.**

Dasyscyphella acutipila Cash in Iowa Studies Nat. Hist. **17**, 216 (1937) non *Dasyscypha acutipila* (Karst.) Saccardo (1889).

Apothecia scattered on bark, disc light orange, up to 1.5 mm. diam., flat; receptacle saucers shaped with a short well defined stalk, white, clothed with short white hairs. Hairs cylindrical, up to $50 \times 3.5-4.5\mu$, some obtusely rounded, others with the apical cell tapering to a rounded point, thinwalled, finely granulate, sometimes with a slight bulbous swelling near the base, septate; asci $60-75 \times 7\mu$, the minute pore blue in Melzer's reagent, 8-spored; ascospores parallel, acicular, slightly curved, $40-44 \times 1\mu$; paraphyses cylindrical with pointed tips, 1.5 thick. On woody stems. Fig. 12.

Collection seen: Panama, Prov. Chiriqui, 1.VII.1935, G. W. Martin 2275 (Typus).

The original specific epithet, not particularly apt, must be changed on transfer to *Dasyscypha* because of the prior *D. acutipila* (Karst.) Sacc. 1889.

Dasyscypha raphidophora (Berk. et Curt.) Dennis, comb. nov.

Peziza raphidophora Berk. et Curt. in J. Linn. Soc. Bot. **10**, 368 (1868).

Erinella raphidophora (Berk. et Curt.) Sacc., Syll. Fung. **8**, 509 (1889).

Erinella cognata Pat. apud Duss, Champ. Guadeloupe, 67 (1903).

Apothecia scattered on bark, disc orange, flat, 2 mm. diam. ; receptacle saucershaped, white, drying buff, densely clothed with short hairs that become buff with age, seated on a short stout stalk which is often black at the base. Hairs cylindrical or slightly enlarged upwards, up to $120 \times 3-3.5\mu$, ends obtusely rounded, walls thin, coarsely granulate, septa rather distant ; asci $100-130 \times 8-9\mu$, 8-spored, bore small, blue in Melzer's reagent ; ascospores irregularly biseriate, fusiform, inaequilateral or slightly curved, nonseptate but often with a clear central area, $37-58 \times 2.5-3\mu$; paraphyses cylindrical, $1.5-2.5\mu$, thick, no longer than the asci. On logs and dead branches. Fig. 13.

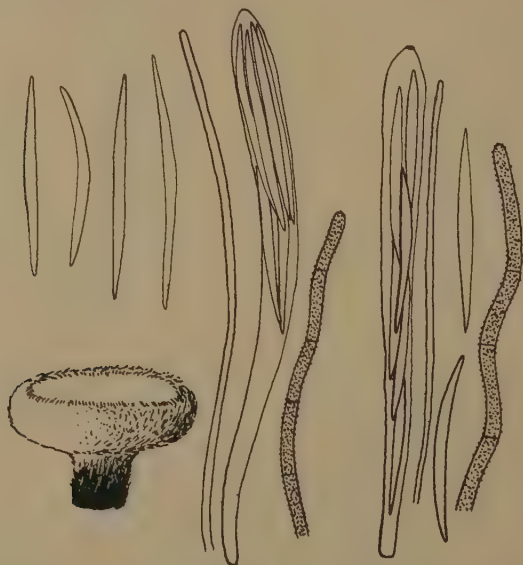


FIG. 13. *Dasyscypha raphidophora*. Left : apothecium $\times 15$, spores, paraphysis, ascus and hair from Wright 364 ; Right : details from Duss 545, $\times 660$.

Collections seen : Cuba, Wright 364 (Typus) ; Venezuela, No. 245 of unnamed collector in Herb. Berk. ; Jamaica, Hermitage reservoir, 17.XII.1949, Dennis 236A ; Guadeloupe, Bois des Bains-Jaunes, Avril 1902 on dead *Myrsine coriacea*, Duss 545 (Typus of *E. cognata* in Herb. Farlow) ; Brasil, Parque Nacional do Serra dos Orgaos, Terezopolis, Rio de Janeiro, 20.VII.1950, G. C. Ainsworth.

- Duss 285, on *Calyptanthes dussii*, also cited in the diagnosis of *E. cognata*, is no doubt the same fungus but is now too scanty to be reexamined.

***Dasyscypha brasiliensis* (Mont.) Le Gal** Discom. de Madagascar 372 (1954).

Cenangium brasiliense Mont. in Ann. Sci. Nat. Ser. 4, 5, 371 (1856).

Peziza illota Berk. et Curt. in J. Linn. Soc. Bot. **10**, 368 (1868).

Dasyscypha illota (Berk. et Curt.) Sacc., Syll. Fung. **8**, 457 (1889).

Lachnum longisporum Karst. in Hedwigia **28**, 191 (1889).

Erinella longispora (Karst.) Sacc., Syll. Fung. **8**, 567 (1889).

Erinellina longispora (Karst.) Seaver, N. Amer. Cup Fungi, Inoperculates, 293 (1951).

Erinella similis Bres. in Hedwigia **35**, 296 (1896).

Dasyscypha gigantospora Rehm in Hedwigia **39**, 219 (1900).

Erinella africana Syd. in Wiss. Ergebn. Deutsch. Zentral African Expt. 1907-1908, **2**, 100 (1910).



FIG. 14. Collections referred to *Dasyscypha brasiliensis*, apothecia $\times 15$, details $\times 660$. A Wright 633, B Moller 12c, C Ule 763, D Typus of *L. longisporum*.

Apothecia scattered on bark, disc 1-2 mm. diam., bright orange, becoming brownish with age, receptacle shallow cupshaped with a short stalk, white to pale buff, clothed with short hairs. Hairs cylindrical with obtusely rounded tips, up to $110 \times 3.4 \mu$, septate, thinwalled, granulate; asci $75-100 (-110) \times 6-8 \mu$, 8-spored, the small pore dark blue in Melzer's reagent; ascospores narrowly fusiform, usually slightly curved and often with a pronounced kink near the base, occasionally becoming 3-septate, $30-46 \times 1.5-2.5 \mu$; paraphyses cylindrical, about 2μ thick, tips usually slightly pointed but no longer than the asci. On logs and dead branches. Fig. 14.

Collections seen: Cuba, Wright 633 (Typus of *D. illota*); Jamaica, Cinchona, Blue Mts., 25.XII.49, Dennis J156; Venezuela Rio Chacaito, Caracas, 18.XI.1949, Dennis 236B; Trinidad, Cerro del Aripo, 23.X.1949, Dennis 236; Brasil, Minas Lafayette, Ed. Wainio 1885, Herb.

Helsinki (Typus of *L. longisporum*) ; *E. Ule* 763, type number of *D. gigantospora* Herb. Stockholm ; Santa Catharina, Blumenau, *Moller* 12c (Typus of *E. similis*, Stockholm) ; Tanganyika, Bukoba, 23.VI.1907, *J. Hildbraed* 251 (Typus of *E. africana*, Stockholm).

This species may ultimately prove inseparable from the preceding especially as the more massive apothecia of Dennis 236B and J156 have black bases. They are placed here on spore characters. Alternatively it may be possible to divide *D. brasiliensis* further on fine characters of septation in hairs and spores but I feel this should not be attempted until it can be correlated with differences in substrate or other distinctive features. In the typus of *D. illota* the hair septa are distant, 20–30 μ apart and this applies also to J156 and 236B. In the type material of *D. gigantospora* and *L. longisporum* and in 236 they are about 10 μ apart. The hairs of *E. africana* show an intermediate spacing. Spore septation, 1, seldom 3, was observed only in 236 but was reported by Karsten in *L. longisporum*. Seaver thought the latter synonymous with *E. subcorticalis* Pat. but Karsten described its spores as up to 40 μ long and I find those of the typus 37–43 \times 1.5–2 μ . The diagnosis of *Dasyscyphella indica* Cash 1948 reads very like that of *D. brasiliensis*.

Dasyscypha inspersa (Berk. et Curt.) Sacc., Syll. Fung. **8**, 437 (1889).

Peziza inspersa Berk. et Curt. in J. Linn. Soc. Bot. **10**, 368 (1868).

Peziza earoleuca Berk. et Br. in J. Linn. Soc. Bot. **14**, 105 (1875).

Trichopeziza earoleuca (Berk. et Br.) Sacc., Syll. Fung. **8**, 409 (1889).

Phialea convoluta Rehm in Hedwigia **39**, 93 (1900).

Dasyscypha puiggari Speg. in Bol. Ac. Nac. Cienc. Cordoba **23**, 180 (1919).

Dasyscypha fasciculata Seaver et Waterston in Mycologia **32**, 397 (1940).

Lachnella fasciculata (Seaver et Waterston) Seaver, N. Amer. Cup Fungi, Inoperculates, 251 (1951).

Apothecia gregarious on decorticated wood, disc less than 1 mm. diam., pale orange ; receptacle shallow cupshaped with a short stalk, white, densely clothed with matted white hairs. Hairs cylindrical, undulating and entangled, sometimes branched, 2–3 μ wide with obtusely rounded ends, thinwalled, sparingly septate, coarsely granulate or encrusted ; asci 35–45 \times 3–4.5 μ , 8-spored, the minute pore blue in Melzer's reagent ; ascospores biseriata, cylindrical or obtuse above and pointed below, 4–5.5 \times 1–1.5 μ ; paraphyses cylindrical, obtuse, 1 μ thick, no longer than the asci. Fig. 15.

Collections seen : Cuba, *Wright* 354 (Typus) ; Jamaica, Markham Hill, Cinchona, Blue Mts., 25.XII.1949, *Dennis* J71 ; Bermuda, Walsingham on *Olea europaea*, 30.XI.1938, Seaver & Waterston Fungi of Bermuda 45, authentic for *D. fasciculata* ; Brasil, *Ule* 849 in Herb. Sydow, Stockholm, authentic for *P. convoluta* ; Saõ Paulo, Apiaty, *J. Puiggari* 134 at Eva Peron, authentic for *D. puiggari* ; Ceylon, *Thwaites* 107, Dec.1868, Typus of *P. earoleuca*. Judging by the description and published figure, *Trichopeziza citrino-alba* Penz. & Sacc. 1904, from Java, may be another synonym.

In its very small asci and spores the species shows affinity with *Eriopeziza* and this is supported by the tendency of the hairs to branch and become entangled like subicular hyphae. In some specimens of *P. earoleuca*, not all, there is a trace of a white subiculum round the base of the apothecia but there is no common web between different apothecia. The incrustation of the hairs is exceptionally coarse in the apothecium of *P. convoluta* examined.

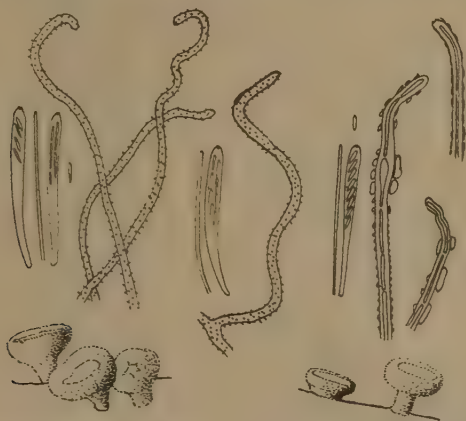


FIG. 15. *Dasyscypha inspersa*, apothecia $\times 15$, details $\times 660$. Left: Wright 354; Centre: Seaver & Waterston 45, Right: Ule 849.

***Dasyscypha dussii* Dennis nom. nov.**

Erinella variegata Pat. in Bull. Soc. Myc. France **16**, 184 (1900) non *Dasyscypha variegata* Fuck. 1873.

Apothecia scattered, superficial, on bark, disc about 1 mm. diam., concave, yellowish; receptacle cupshaped then expanded with a well defined slender stalk, light yellow, clothed with rather short hairs. Hairs yellowish, up to $90 \times 3\mu$, closely septate, the terminal cell often clavate and expanded to 5-6 and filled with yellow oil, wall thin and finely granulate; asci $80-90 \times 7\mu$, 8-spored, the minute pore blue in Melzer's reagent; ascospores parallel, acicular, undulating, $45-55 \times 1.5\mu$, paraphyses broadly lanceolate, $4-5\mu$ wide, longer than the asci. On fallen twigs. Fig. 16.

Collection seen: Guadeloupe. Duss 1706, 13.II.1900, Typus in Herb. Farlow.

***Dasyscypha orinocensis* (Pat. et Gaill.) Dennis, comb. nov.**

Erinella orinocensis Pat. et Gaill. in Bull. Soc. myc. France **4**, 101 (1889).

Apothecia scattered, superficial, disc concave, cream, less than 1 mm. diam., receptacle cupshaped, reddish brown, clothed with long brown diverging hairs. Hairs up to about 250μ long, tapering evenly from about 5μ at the base to about 2μ at the rounded tip, sparingly septate, the thin brown wall covered with fine granules except for an occasional smooth zone just above a septum; asci $90-95 \times 10-12\mu$ with a rather

broad pore blue in Melzer's reagent ; ascospores parallel, fusiform, inaequilateral and slightly curved or sometimes clavate and tapering below, $37-47 \times 2-2.5\mu$; paraphyses narrowly lanceolate, 2μ wide. On dead stems of Cannaceae. Fig. 17.



FIG. 16. *Dasyscypha dussii*, apothecia $\times 15$, spores, ascus, paraphysis and hairs $\times 660$.

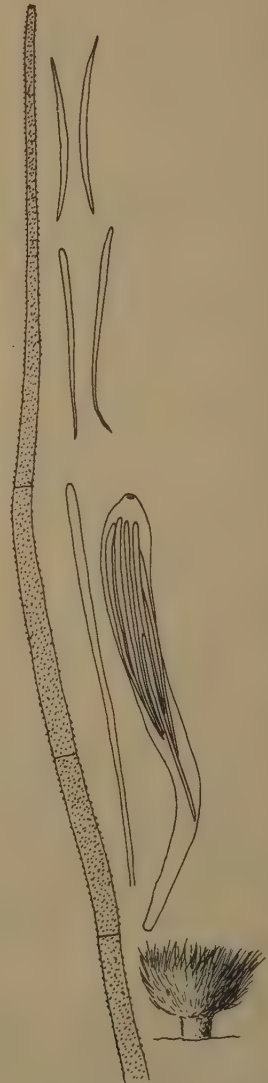


FIG. 17. *Dasyscypha orinocensis*, apothecium $\times 15$, hairs, spores, paraphysis and ascus $\times 660$.

Collection seen : Venezuela, R. Orinoco, Puerto Zamuro, 25.III.1887 (Typus).

Gaillard found the receptacles white when fresh and presumably the hairs were then hyaline. The spores are said to become 3-septate.

***Dasyscypha lasserii* Dennis spec. nov.**

Sparsa, stipitata, 1 mm. alta, cupula plana, orbiculari margini pilis hyalinis rugosis septatis $70-110 \times 3.5-4\mu$ cylindratis apice obtusis ciliata, extus alba, disco 1 mm. diam., flaveolo, stipite gracili, cylindrato, albo; ascis cylindratis, deorsum attenuatis, apice poro pertusis, $95-108 \times 8\mu$, sporidiis filiformibus, gracilibus, flexuosis, $65-80 \times 1-1.5\mu$, paraphysibus hyalinis, asco longioribus sursum acuminatis $2-2.5\mu$ crassis. Ad caules graminum. Fig. 18.

1600 m. El Junquito, Distrito Federal, Venezuela, 16.XI.1949, *Dennis* 360, Typus.

This species closely resembles *D. apala* (Berk. et Br.) *Dennis* but has much larger asci and spores.

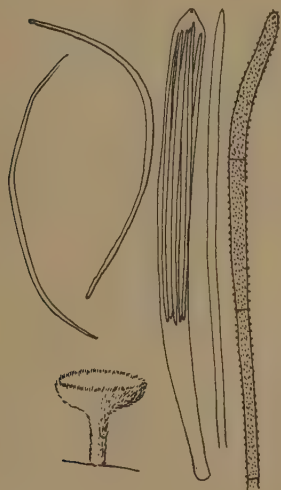


FIG. 18. *Dasyscypha lasserii*, apothecium $\times 15$, spores, ascus, paraphysis and hair $\times 660$.

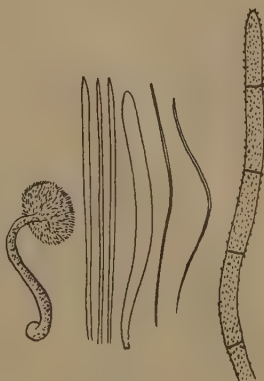


FIG. 19. *Dasyscypha mapiriana*, apothecium $\times 15$, paraphyses, ascus, spores and hair $\times 660$.

***Dasyscypha mapiriana* (Pat. et Gaill.) *Dennis*, comb. nov.**

Erinella mapiriana Pat. et Gaill. in Bull. Soc. myc. France **4**, 100 (1889).

Apothecia scattered, superficial, disc about 0.5 mm. diam., cream; receptacle saucers shaped on a long slender stalk, white, drying pinkish-buff, clothed with downy hairs. Hairs $75-95 \times 4-4.5\mu$, cylindrical with obtusely rounded tips, sparingly septate, walls thin, colourless, granulate; excipulum of parallel hyphae 3μ wide; asci about $60 \times 4\mu$, pore reaction uncertain owing to its minute size; ascospores acicular, slightly curved or flexuous, $53-60 \times 0.5\mu$; paraphyses cylindrical, $1-2\mu$ thick, pointed above. On dead leaves. Fig. 19.

Collection seen: Venezuela, R. Orinoco, Mapire, May 1887, *Gaillard* 16 (Typus).

Dasyscypha fimbriifera (Berk. et Curt.) Sacc., Syll. Fung. **8**, 452 (1889).
Peziza fimbriifera Berk. et Curt. in J. Linn. Soc. Bot. **10**, 367 (1868).

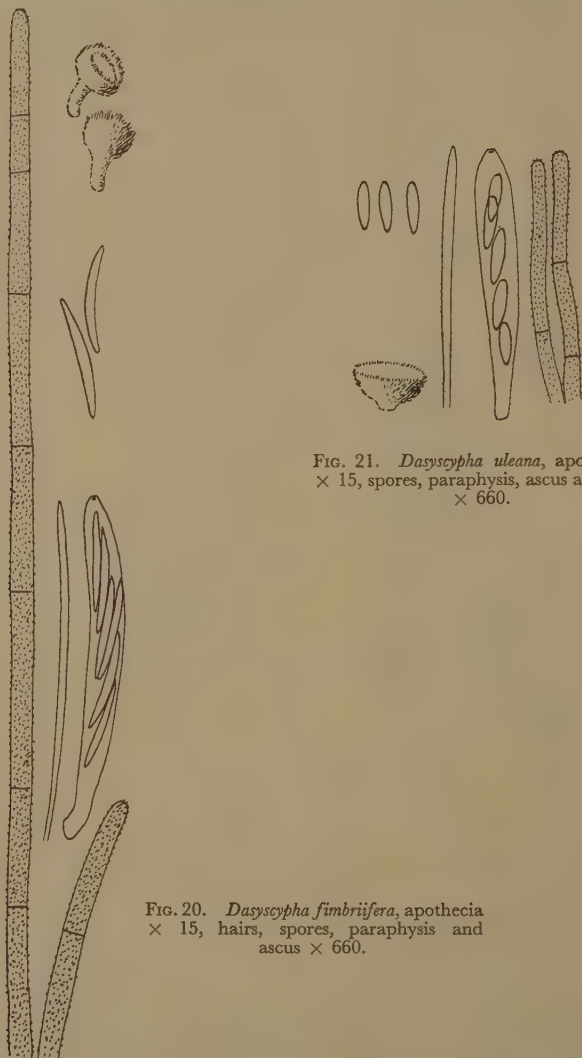


FIG. 21. *Dasyscypha uleana*, apothecium
 $\times 15$, spores, paraphysis, ascus and hairs
 $\times 660$.

FIG. 20. *Dasyscypha fimbriifera*, apothecia
 $\times 15$, hairs, spores, paraphysis and
 ascus $\times 660$.

Apothecia scattered, superficial, disc concave, about 0.5 mm. diam., cream; receptacle cupshaped, clothed with diverging white hairs, seated on a short downy stalk, brown at the base. Hairs of two lengths, a dense covering of short, hyaline, granulate, obtuse hairs 5μ wide with interspersed much longer similar hairs, up to 250μ long, tapering from 6μ at the base to $2-4\mu$ at the rounded tip, multiseptate; excipular hyphae 4μ wide, brown-walled in the lower half of the stipe, hyaline else-

where ; asci $80 \times 8\mu$, 8-spored, pore blue in Melzer's reagent ; ascospores fusiform, slightly curved, non-septate, $25-28 \times 2-3\mu$; paraphyses cylindrical, tapering at the tip, 2μ thick. On fern stems. Fig. 20.

Collection seen : Cuba, December, *Wright* 654 (Typus) and as *Fungi Cubenses* 681.

Dasyscypha uleana (*Rehm*) *Dennis*, comb. nov.

Solenopezia uleana *Rehm* in *Hedwigia* **39**, 94 (1900).

Apothecia scattered, superficial, disc about 0.5 mm. diam., cream ; receptacle cup-shaped on a small base, white, clothed with short white hairs. Hairs cylindrical, $50-60 \times 3-4\mu$, tips obtusely rounded, walls thin, hyaline, finely granulate, 1-2-septate ; asci $55-60 \times 6-8\mu$, 8-spored, pore small, blue in Melzer's reagent, ascospores biserial, narrowly elliptical, $9-12 \times 2.5-3\mu$; paraphyses slightly lanceolate, 2μ thick, no longer than the asci. Fig. 21.

On leaves of *Cyperaceae*.

Collection seen : Brasil, Serra do Itatiaia, January 1896, *E. Ule*, in *Rabenhorst-Pazschke Fungi europaei et extraeuropaei* 4374, presumed authentic for the name.

Rehm thought the spores 1-septate but that is not apparent in the portion examined and if correct it does not indicate a transfer of the species from *Dasyscypha*. It differs from european *Hyaloscyphaceae* on *Cyperaceae* in its larger ascospores.

Dasyscypha ulei (*Wint.*) *Sacc.*, *Syll. Fung.* **8**, 452 (1889).

Peziza ulei *Wint.* in *Hedwigia* **24**, 258 (1885).

This minute but beautiful species on living fronds of *Gleichenia dichotoma* is easily recognised by its habitat and crimson colour. To the otherwise adequate diagnosis by *Winter* may be added the hair characters : cylindrical, obtusely rounded above, sparingly septate, thinwalled, finely granulate, about $60 \times 3-4\mu$. The asci, $47-65 \times 5-7\mu$, have the pore blued by Melzer's reagent, ascospores $15-18 \times 2.5\mu$. The red sap turns mauve in KOH solution.

Collection examined : Brasil, Santa Catharina, Saõ Francisco, July-Oct. 1884, *E. Ule* in *Rabenhorst-Winter Fungi europaei* 3273, part of the type collection.

Ule reported it later on the same host from Tarapoto in amazonian Peru.

Dasyscypha dicranopteridis *Seaver et Whetzel* 1926, on *Gleichenia pectinata* in Porto Rico has been distinguished from *D. ulei* only by its smaller asci, $40-50 \times 5\mu$, and spores, $10-11 \times 2\mu$.

Dasyscypha varians *Rehm* in *Hedwigia* **39**, 94 (1900).

Apothecia scattered, superficial, disc concave, about 0.5 mm. diam., yellowish ; receptacle saucer-shaped, yellowish, covered with diverging yellow hairs, seated on a short, slender, hairy stalk. Hairs $40-80 \times 4-5\mu$, cylindrical with obtusely rounded tips, the longer somewhat tapering, rather closely septate, with thin granulate walls ; asci $50 \times 5\mu$,

8-spored, pore blue in Melzer's reagent ; ascospores biseriate, narrowly elliptical, $8-10 \times 2\mu$; paraphyses cylindrical, slightly pointed above, 2μ thick, somewhat longer than the asci. On stems. Fig. 22.

Collection seen : Brasil : *E. Ule* 758 on unnamed stems, parts of the type number in Herb. Rehm and Herb. Sydow at Stockholm.

The type collection of *Dasyscypha flavidula* Rehm 1909, Brasil, Rio Grande do Sul, São Leopoldo, leg. Theissen, Sept. 1890, does not appear to me separable from the above species on morphological grounds. According to the label on the type packet in Rehm's herbarium at Stockholm it was on "Farn-Wedel" but in the diagnosis this was queried thus, "Hab. ad stipites Filicis ?".



FIG. 22. Left : *Dasyscypha varians*, Ule 758 ; Right : *D. flavidula*. Apothecia $\times 15$, details $\times 660$.

***Dasyscypha virginea* (Batsch ex Fr.) Fuckel** in Jahrb. Nass. Ver. Nat., 305 (1870).

The following West Indian collection, with cylindrical, obtuse, thin-walled, granulate hairs, $60 \times 3-4\mu$, lanceolate paraphyses and ascospores $6-7 \times 1.5\mu$, seems referable to the above common north temperate species ; Jamaica, 5,000 ft., Cinchona, Blue Mts., on sticks, 24.XII.1949, *Dennis* J59.

***Dasyscypha andina* (Pat.) Dennis**, comb. nov.

Erinella andina Pat. in Bull. Soc. myc. France **9**, 146 (1893).

Apothecia scattered, superficial ; disc about 0.5 mm. diam., light brown with a white margin ; receptacle saucers shaped, sessile on a broad base, white, clothed with long, erect, white hairs. Hairs up to 200μ long, 3μ thick at the base, tapering evenly to a sharp point, multiseptate, wall thin and smooth ; asci $75-80 \times 7-8\mu$, 8-spored, pore blue in Melzer's reagent ; ascospores narrowly elliptical, 1-3-septate, $18-25 \times 3\mu$; paraphyses cylindrical with pointed tips, 1.5μ thick. On dead herbaceous stems. Fig. 23.

Collection seen : Ecuador, Ravine near Quito, Leg. de Lagerheim (Typus in Herb. Farlow).

Patouillard found even longer hairs, up to $300 \times 4\mu$ and thought them rough. They appear to me to have a smooth wall partly covered by a mucilaginous investment containing scattered, short, bacterium-like rods, which extends also over the surface of the excipulum. *D. andina*, *D. acutipila* (Karst.) Sacc., *D. albotestacea* (Desm.) Massee, *D. laetior* (Karst.) Sacc., *Lachnum caducum* (Rehm) Rehm and *Lachnum adenostylidis* Rehm form a very natural group somewhat transitional between *Dasyscypha* and *Hyaloscypha*.



FIG. 23. *Dasyscypha andina*, apothecium $\times 15$, details $\times 660$.

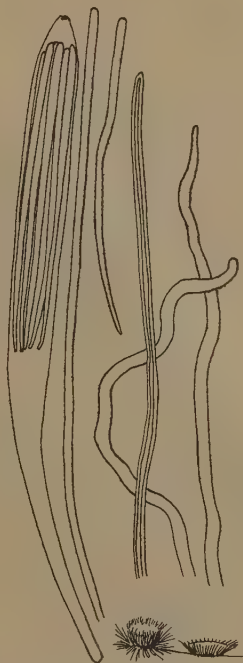


FIG. 24. *Peziza miniopsis*, apothecia $\times 15$, details $\times 660$.

Another species with smooth-walled hairs, sometimes referred to *Dasyscyphella*, is *Peziza miniopsis* Ellis from North America. In this case, however, the hairs are thickwalled, undulating, obtuse and nonseptate like those of *Hyalotricha* but the asci and spores are much larger than those of any species so far referred to that genus. Fig. 24.

Wright 360 from Cuba, published by Berkeley and Curtis as *Peziza varicolor* Fr., is another species of *Dasyscypha*, as yet undetermined, with hairs of the thinwalled, cylindrical, granulate type and ascospores 5-septate, $70-83 \times 3-4\mu$.

Hyaloscypha Boudier in Bull. Soc. myc. France **1**, 118 (1885).

Berkeley and Curtis (1868) recorded *Wright* 367 from Cuba as *Peziza hyalina* Pers., i.e. *Hyaloscypha hyalina* (Pers. ex Fr.) Boud. Examination of the material shows, however, that this was a misdetermination and that the fungus in question is probably not to be referred to *Hyaloscypha*. The apothecia are hyaline, about 400μ diameter, saucershaped with a short stalk; excipulum formed of parallel hyphae 2μ thick, running out into slender, obtuse, downy hairs about $10-20 \times 2\mu$; asci $30 \times 5\mu$, 8-spored; ascospores $3.5-4.5 \times 1-1.5\mu$; paraphyses filiform; gregarious on rotten wood. Fig. 25.

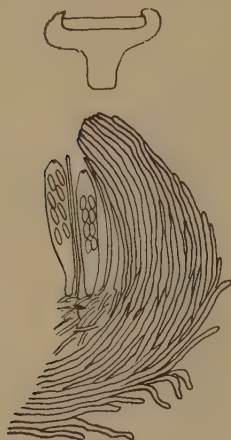


FIG. 25. *Wright* 367, median section $\times 50$, details $\times 660$.

Wright 367 is very like *Peziza incrustata* Ellis, described from decaying polypores in North America but I hesitate to propose a precise identification until fresher material is available. In the meantime the record of *H. hyalina* from the West Indies is to be rejected and this genus, so abundant in North Temperate forests, has still to be found in the American tropics.

Cash (1937) reported *Davincia helios* Penz. & Sacc. from Panama. The structure of this is unknown to me but the published figures suggest it may be Helotiaceous.

HELOTIACEAE

The following key will separate the genera I have seen from tropical America but intensive collecting will no doubt reveal many more in this vast and almost untouched field.

I. Flesh not gelatinous :

A. Apothecia light brown, gray or black, on woody substrata :

1. Apothecia sessile, minute, light brown, excipulum distinctly fibrous :

- a. Ascospores elongated, multiseptate *Pseudohelotium*
- b. Ascospores elliptical, nonseptate *Patinellaria*

2. Apothecia stalked, much larger, excipulum of shorter and broader or isodiametric cells :

- a. Apothecia tough, usually more or less excentric :

• Spores globose *Midotiopsis*

• Spores elliptical or reniform :

* Flesh yielding a deep violet solution in KOH solution

Ionomidotis

** Not as above :

† Apothecia with long much branched stalks . *Cordierites*

†† Apothecia sessile or stalks unbranched . *Encoelia*

- b. Apothecia softfleshed, regular, often arising from a blackened area *Rutstroemia*

- B. Apothecia white or bright coloured, usually some shade of yellow, orange or green :

1. Excipulum formed of isodiametric cells and having a mealy surface, apothecia clustered, on wood *Encoelia*

2. Excipulum formed of undulating, rather thickwalled hyaline hyphae, lying at a high angle to the surface, on wood :

- a. Apothecia subsessile, disc more or less yellow or whitish

Calycella

- b. Apothecia distinctly stalked, blue-green . . *Chlorociboria*

3. Excipulum of thinwalled hyphae lying at a low angle to the surface or composed of short prismatic cells but then soft-fleshed and not mealy, apothecia often stalked :

* Spores 0-1-septate :

† Apothecia stipitate, on plant debris . . . *Helotium*

†† Apothecia sessile, on soil *Discinella*

** Spores 3 or more septate *Belonidium*

II. Flesh gelatinous, at least in the greater part :

1. Saprophytes on woody substrata :

- A. Excipulum with an outer parenchymatous layer . . *Coryne*

- B. Excipulum prosenchymatous throughout, often with a gelatinous surface *Ombrophila*

2. Parasitic on mycelium of *Meliola* *Calloriopsis*

DURELLOIDEAE

Patinellaria Karst. in. Acta Soc. Fauna Flora Fenn. 2 (6), 152 (1885).

Patinellaria cubensis (Berk. et Curt.) Dennis, comb. nov.

Sphinctrina cubensis Berk. et Curt. in J. Linn. Soc. Bot. 10, 370 (1868).

Cenangium xylariicola Massee in J. Linn. Soc. Bot. 35, 102 (1901).

Dermatea mycophaga Massee in Kew Bull., 218 (1908).

Apothecia solitary or in clusters on a common stromatic base, often surrounded by a small mat of buff hyphae like an incipient subiculum ; disc up to 1 mm. diam., dark reddish-brown, slightly pruinose when dry ; receptacle cupshaped, sessile on a broad base, reddish-brown. Stromatic base a pseudoparenchyma of polygonal cells with thin reddish-brown walls, flesh of closely packed concolorous hyphae, curving outwards at a high angle to the surface in the excipulum, surface cells clavate, 6.8μ diam. ; asci cylindric-clavate, longstalked, 8-spored, $70.90 \times 5.6\mu$, the pore not blued by Melzer's reagent ; ascospores uniseriate, narrowly elliptical, biguttulate, $6.7 \times 2.5.3\mu$; paraphyses cylindrical, obtuse, 2μ thick. On ascocarps of *Xylaria* and allies. Fig. 26.



FIG. 26. *Patinellaria cubensis*, cluster of apothecia showing the subiculum $\times 15$, radial section of margin $\times 660$.

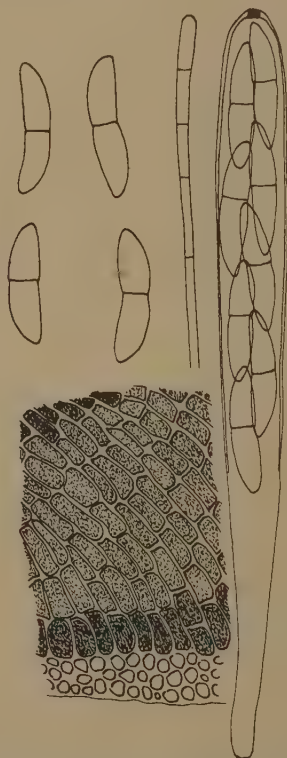


FIG. 27. *Belonium rimosum*, details of excipulum in radial section, spores, ascus and paraphysis $\times 660$.

Collections seen : Cuba, *C. Wright* 525 (Typus) ; Venezuela, No. 255 in Herb. Berkeley (Typus of *C. xylariicola*) ; Malaya, *Ridley* 158 (Typus of *D. mycophaga*) ; Uganda, on *Kretzschmaria*, *T. D. Maitland*, June 1915 ; *T. D. Maitland* 70, 1914.

From *Dermea* (= *Dermatea*), to which there is some superficial resemblance, the species is separated anatomically and by its small asci with

negative iodine reaction and minute spores. From *Encoelia* it differs in the very small apothecia without a sharply differentiated pseudoparenchymatous excipulum. *Patinellaria* Karst. was based on *Peziza sanguinea* Fuckel, a species which agrees with *P. cubensis* in hymenial characters and in having a subiculum. Nannfeldt treats it as a synonym of *Durella*.

Belonium rimosum Cash in Iowa Studies Nat. Hist. **17**, 215 (1937).

Apothecia scattered or in small groups, superficial, sessile; disc flat, up to 2 mm. diam., dark brown; receptacle saucer-shaped, smooth, concolorous or almost black, seated on a small base. Excipulum formed of prismatic cells about $10-15 \times 5\mu$, arranged in parallel rows at a high angle to the surface, with thin colourless walls and dark brown contents, covered on the lower part of the receptacle by a thin, small-celled, hyaline layer; subhymenium thin, paler; asci clavate, rather thick-walled, 8-spored, $150-175 \times 15-18\mu$, pore deep blue in Melzer's reagent; ascospores biseriate, fusiform, inequilateral or slightly curved, 1-septate, $22-33 \times 5-7\mu$; paraphyses cylindrical, septate, the upper cells with brownish contents and rather firmly coherent like a rudimentary epithelium, 3μ thick. On woody stems. Fig. 27.

Collection seen: Colombia, 1500-2300 m. in Sierra Nevada de Santa Marta, 23.VIII.1935, G. W. Martin.

Cash found ascospores up to $38 \times 8\mu$. The species certainly does not belong to *Belonium*, a Dermateaceous genus with hairy apothecia on grasses, but it is difficult to place it correctly at present. Cash interpreted the structure as prosenchymatous and referred the fungus to Helotiaceae, in which case its dark colour and superficial habit indicate a place in Durelloideae and presumably in *Durella* as redefined by Nannfeldt (1932). The structure of the excipulum, however, does not match that of any *Durella* known to me and I am unwilling to propose a transfer of the species at present. Its closest affinity is with *Patinella coracina* Bres. which Nannfeldt (1932) referred to Dermateaceae where "sie repräsentiert wahrscheinlich eine noch unbeschriebene Gattung". The asci of *P. coracina*, however, give a negative pore reaction with iodine. In hymenial characters *B. rimosum* also resembles *Cenangella radulicola* (Fuckel) Rehm but unfortunately that too is a species of uncertain systematic position. There is also some resemblance to *Mollisia ventosa* Karst., an atypical *Mollisia* with rather similar excipulum and similarly shaped, though much smaller, 1-septate ascospores. The species of *Durella* mostly have asci with a negative reaction to Iodine.

Pseudohelotium Fuckel in Jahrb. Nass. Ver. Nat., 298 (1870).

Pseudohelotium sordidum (Cash) Dennis, comb. nov.

Belonium sordidum Cash in Iowa Studies Nat. Hist. **17**, 215 (1937).

Apothecia scattered, superficial, disc up to 500μ diam., convex when moist, pallid; receptacle cupshaped on a small base, smooth, light brown, darker at the base. Excipulum formed of parallel hyphae, $3-4\mu$ wide, with thin brown walls, lying at a low angle to the surface; asci clavate, $95-120 \times 14-16\mu$, 8-spored, pore not blued by Melzer's reagent; ascospores irregularly biseriate, elliptic-fusiform or slightly

clavate, often slightly curved, 7-septate, $37-44 \times 5-6\mu$; paraphyses filiform, 1μ thick, branched above and terminated by a few moniliform cells. On decorticated wood. Fig. 28.

Collection seen: Panama, Prov. Cocle, Valle Chiquita, 25.VII.1935, G. W. Martin 3008 (Typus).

Were it not for its light colour the species might well be referred to *Durella* Tul. but in colouring, stature, habit and structure it agrees well with *Peziza pineti* Batsch, the type species of *Pseudohelotium*. *Peziza raphidospora* Ellis, on coniferous wood in North America, also belongs here rather than with the Hyaloscyphaceae. Fig. 29.

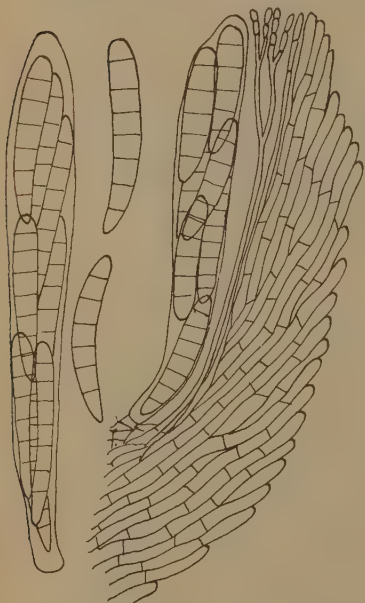


FIG. 28. *Pseudohelotium sordidum*, section of margin, ascus and spores $\times 660$.

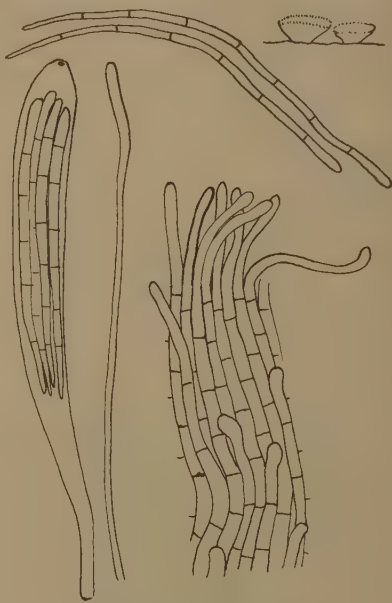


FIG. 29. *Peziza raphidospora*, apothecia $\times 15$, surface view of margin, ascus, paraphysis and spores $\times 660$.

HELOTIOIDEAE

Calycella Boud. in Bull. Soc. myc. France **1**, 112 (1885).

Calycella is a small genus of sessile lignicolous Helotiaceae, mostly more or less yellow, at least in the disc, with the excipulum composed of undulating rather thick-walled hyphae lying at a high angle to the surface and not clearly differentiated from the hyphae of the flesh. The ascus pore seems to give a negative reaction to iodine in both the tropical American species seen; both are clearly closely related to common fungi of north temperate forests.

- A. Spores $15-16 \times 3\mu$ *C. citrina*
- B. Spores $7-10 \times 1-1.5\mu$ *C. discedens*

Calycella citrina (Hedw. ex Fr.) Quél., *Enchiridion fungorum* 300 (1886).

Peziza citrina Hedw. ex Fr., *Syst. Myc.* **2**, 131 (1822).

Helotium citrinum (Hedw. ex Fr.) Fr., *Summa Veg. Scand.* 355 (1846).

Phialea citrina (Hedw. ex Fr.) Gillet, *Champ. de France, Discomycetes*, 109 (1879).

Peziza crocina Berk. et Curt. in *J. Linn. Soc. Bot.* **10**, 369 (1868).

Helotium crocinum (Berk. et Curt.) Sacc., *Syll. Fung.* 223 (1889).

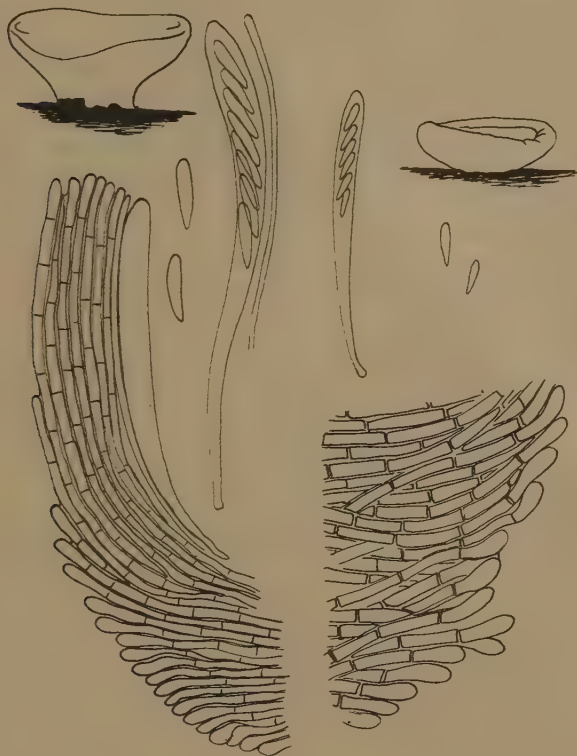


FIG. 30. Left : *Peziza crocina* from Wright 374 ; Right : *Calycella discedens* from Wainio's material. Apothecia $\times 15$, details $\times 660$.

Disc about 2 mm. diam., flat to slightly concave, deep yellow ; receptacle smooth, cupshaped, sessile, concolorous or paler. Excipulum of subparallel, undulating, hyaline hyphae 3μ thick, with moderately thick walls, terminating at the surface in rounded thinwalled cells ; asci clavate, $110 \times 9\mu$, 8-spored ; ascospores elliptical, somewhat pointed below, continuous, $15-16 \times 3\mu$; paraphyses cylindrical, obtuse, 2μ thick. On twigs. Cuba, Wright 374, (typus of *P. crocina*). Fig. 30 left.

This is no more than a state of the cosmopolitan *Calycella citrina*, with rather narrow spores. Unfortunately Berkeley did not measure the spores when fresh, indeed they are not even mentioned in the diagnosis. Massee (1901) has already reexamined Wright's material and reported larger spores, $18-21 \times 4.5\mu$, some 1-septate. European collections of *C. citrina* have spores about $9-14 \times 3-5\mu$, often becoming 1-septate. Duss (1903) has reported *C. citrina* from Guadeloupe.

***Calycella discedens* (Karst.) Dennis, comb. nov.**

Helotium discedens Karst. in *Hedwigia* **28**, 191 (1889).

Niptera subiculata Seaver in *Mycologia* **16**, 8 (1924).

Apothecia scattered, sessile, disc up to 1 mm. diam., deep yellow, flat with a broad, pale, rounded rim; receptacle saucer-shaped, cream, smooth. Excipulum formed of subparallel undulating hyphae, 4μ thick, with hyaline walls almost 1μ thick, ending at the surface in thin-walled cells with protruding rounded tips; asci clavate, pore not blued in Melzer's reagent, 8-spored, $65-75 \times 5-6\mu$; ascospores biserial, fusiform-clavate, $6-10 \times 1.5-2\mu$; paraphyses slender, cylindrical, 1μ thick. On bark and wood. Fig. 30 Right.

Collections seen: Brasil, Minas Geraes, Sitio, Leg. E. Wainio 1885 (Typus at Helsinki); St. Thomas, Virgin Is. March 1923, F. J. Seaver 829 (Typus of *N. subiculata*).

This seems very near the European *Phialea subpallida* Rehm. The type collection of *N. subiculata* differs from that of *C. discedens* only in its frequently 1-septate ascospores. The asci of the latter examined appeared somewhat unripe and ascospore septation seems generally an unreliable character in the inoperculates. The "subiculum" of *N. subiculata* is merely a smooth blackened surface to the very rotten twig on which it grew and does not extend under all the apothecia.

Judging by the slide preserved at the British Museum *Solenopezia grisea* A. L. Smith from Dominica may also be a *Calycella*, with 1-septate spores $14-15 \times 5\mu$.

***Chlorociboria* Seaver in *Mycologia* **28**, 390 (1936).**

***Chlorociboria aeruginosa* (OEd. ex Fr.) Seaver op. cit.**

Helotium aeruginosum (OEd. ex Fr.) Fr., *Summa Veg. Scand.* 355 (1849).

Chlorosplenium aeruginosum (OEd. ex Fr.) de Not. in *Comm. Critt. Ital.* **1**, 376 (1864).

Chlorosplenium puiggarii Speg. in *An. Soc. Cient. Argentina* **12**, 1881 (p. 89 of reprint).

Such a cosmopolitan fungus is too well known to require redescription and only the more important synonymy is given above. The ascospores of the material cited measure $5-7 \times 1.5\mu$. On green-stained decorticated wood.

Tropical American collections seen: Cuba, C. Wright 625; Jamaica, Sir John Peak, Blue Mts., 26.XII.1949, Dennis J155; Brasil, São Paulo, Apiaby, May 1881, J. Puiggari 1490 and 1556, type numbers of *C. puiggarii* at Eva Peron.

Helotium Pers. ex Fr. Summa Veg. Scand. 354 (1849).

As here understood *Helotium* is a genus of light-coloured, usually stalked, inoperculates, with a prosenchymatous excipulum rather sharply differentiated from the more slender hyphae of the flesh and with elliptical to fusiform spores continuous or 1-septate. *Cudoniella* Sacc. is a synonym which has been used for species with a strongly convex hymenium.

Key to the tropical American species seen :

A. Spores not more than 10μ long :

- a. Disc always strongly convex, yellow, with rather hard white flesh
H. gedeanum
- b. Disc concave or flat when dry, convex only when soaked or not at all :

1. On dead leaves :

- * Subhymenium dark reddish-brown, disc similarly coloured and convex when soaked up, apothecia borne on blackened patches of a leaf *H. uleanum*

- ** Subhymenium not darker than the rest of the flesh :

Excipulum of short-celled thinwalled hyphae, almost pseudo-parenchymatous at the surface, apothecia minute, long-stalked *H. phlebophorum*

Excipulum of parallel hyphae at a low angle to the surface.

H. caracassensis

2. On palm petioles, often on blackened areas . *H. atosubiculatum*

3. On wood or bark, large species up to 5 mm. across :

- * Disc copper-coloured, spores $6-8 \times 2-2.5\mu$. . . *H. cupreum*

- ** Disc pallid, spores $6-10 \times 2-2.5\mu$ *H. leucopsis*

B. Spores $11-18 \times 4\mu$, apothecia sessile, disc yellow, on wood

H. umbilicatum

C. Spores over 20μ long, apothecia deep yellow or red :

- a. On dead leaves, spores $21-30 \times 2.5-3\mu$ *H. crocatum*

b. On bark or wood :

1. Apothecia red, spores $30-36 \times 5.5-6\mu$ *H. miniatum*

2. Apothecia deep orange, spores $24-31 \times 5-7\mu$. . *H. fuscopurpureum*

Duss (1903) recorded the european *H. epiphyllum* Fr., a yellow sessile species on dead leaves, with ascospores $15-18 \times 3.5-5\mu$, from Guadeloupe. Another of his finds, *H. sloaneae* Pat. with ascospores $30-37 \times 7-8\mu$, on twigs of *Sloanea massoni*, cannot now be traced at the Farlow herbarium. I have been unable to obtain material of *H. discula* Ferd. et Winge, on wood in Venezuela. Its description, with capitate paraphyses, 1-septate spores $10.5-14 \times 2.5-3.75\mu$ and "membrana tota ascorum nec non paraphysibus iodi ope intense caerulescentibus" is reminiscent of *Microphiale*. It can be no *Helotium* and if not a lichen must at least belong to the Lecanorales.

Helotium gedeanum* Dennis, nom. nov.Cudoniella javanica* P. Henn. in *Monsunia* **1**, 173 (1899).

Apothecia gregarious or in small clusters, superficial on decorticated wood; disc 3–4 mm. diam., convex, tawny, drying russet and then minutely pruinose, margin recurved, obtuse; receptacle concolorous, seated on a short slender stalk, minutely scurfy. Flesh white, tough, composed of rather loosely woven hyaline hyphae 4μ wide; excipulum of tightly woven hyphae with an almost pseudoparenchymatous appearance in radial section, covered with brown, thinwalled, unicellular, obtuse hairs about $30 \times 5\text{--}6\mu$; asci cylindric-clavate, 8-spored, pore minute, dark blue in Melzer's reagent, $65\text{--}75 \times 5\text{--}6\mu$; ascospores biseriate, elliptic-fusiform, $7\text{--}11 \times 2\text{--}2.5\mu$; paraphyses cylindrical, 1.5μ thick, obtuse. Fig. 31.



FIG. 31. *Helotium gedeanum*. Habit sketch natural size, median section $\times 5$, portion of excipulum, ascus, paraphysis and spores $\times 660$.

Collections seen: Jamaica, on logs, Mossman's Peak, Blue Mts., 22.XII.1949, *Dennis* J50; Ceylon, Hakgala, *Petch* 4140.

The typus, from Mt. Gedeh, Java was probably lost with the Berlin herbarium. All three known collections are from high wet mountains in the tropics. The slightly pruinose appearance and reddish-brown colour of the dried convex disc may at first sight suggest a *Pezicula* but the habit is otherwise different and the structure is clearly Helotiaceous. Henning's specific epithet is preoccupied in *Helotium* by *H. javanicum* Penz. et Sacc. *H. cudonioides* Seaver, from N. America, is superficially similar but was described as having asci $100 \times 10\text{--}12\mu$ with ascospores $16\text{--}20 \times 5\mu$.

***Helotium phlebophorum* Pat.** in *Bull. Soc. myc. France* **18** p. 179, 1902.

Apothecia superficial, solitary, on rotting leaves; disc flat, about 700μ diam., apparently whitish when fresh, drying blackish-brown; receptacle saucer-shaped, minutely pruinose, concolorous, seated on a long slender stalk. Flesh of thinwalled hyphae, $3\text{--}4\mu$ wide, parallel in the stalk, loosely woven in the receptacle, becoming short-celled and parallel towards the surface and margin, outermost layers of the excipulum formed of thinwalled isodiametric cells $4\text{--}5\mu$ diameter; asci 8-spored, $55 \times 5\mu$, pore apparently not blued by Melzer's reagent; ascospores uniseriate,

slightly clavate, $5-7 \times 1.5-2\mu$; paraphyses cylindrical, obtuse, 1.5μ thick, colourless. Fig. 32.

Collection seen: Guadeloupe, Camp Jacob, *Duss* 240, typus in Herb. Farlow.

The fungus on *Cecropia* leaves in Porto Rico which Seaver called *Phialea cecropiae* (Henn.) Seaver is morphologically almost identical with *H. phlebophorum* though the apothecia have not dried quite as dark brown. The typus of *Helotium cecropiae* Henn. 1902, from Santa Catharina, Brasil, must be presumed lost with the Berlin Herbarium.

FIG. 32. *Helotium phlebophorum*, apothecium $\times 15$, radial section and spores $\times 660$.



Of *Phialea microspora* Seaver, also from Porto Rico, very little remains. In Seaver 161, on leaves of *Syzygium jambos* (L.) Alston* I found a few apothecia structurally also very near to *H. phlebophorum*. Much more field work will be required before we can feel sure whether these three names apply to one plurivorous species or to three, or more, very similar species specialised on different hosts. Structurally they are more like *Ciboria* than *Helotium* but I prefer not to transfer them to *Ciborioideae* until they have been studied in the fresh state and, if possible, isolated in agar culture.

The following species have almost the same hymenial characters but seem easily separable on the colour and structure of the receptacle. Probably, too, they occur on quite different hosts but of these nothing is known.

Helotium uleanum (Rehm) Dennis, comb. nov.

Phialea uleana Rehm in Hedwigia 39, 93 (1900).

Apothecia scattered on blackened spots on leaves; disc concave when dry, convex and somewhat purplish-brown when soaked up, 2 mm. diam.; receptacle saucer-shaped, soft, smooth, seated on a slender

*Det. N. Y. Sandwith.

cylindrical stalk. Excipulum of prismatic cells with thin reddish-brown walls, about 3 cells thick on the under surface of the receptacle, thicker and with a darker inner zone continuous with the dark red-brown hypothecium towards the margin, marginal cells slightly clavate and protruding; flesh of loosely woven hyphae about 3μ wide; asci $45-50 \times 5\mu$, 8-spored, pore blue in Melzer's reagent; ascospores uniseriate or biseriate, elliptical, $6-7 \times 2.5\mu$, paraphyses cylindrical, 2μ thick, obtuse.

Collection seen: Brasil, *Ule* 846, type number in Herb. Sydow, Stockholm.

The host is unknown, a rotten coriaceous leaf, probably dicotyledonous according to Dr. Metcalfe. This is clearly not a *Phialea* in the sense of von Höhnelt or Nannfeldt. At first sight its colour, habit and association with blackened areas of the substrate suggest a *Rutstroemia*, i.e. a *Phialea* in the sense of Boudier. The excipular structure would also be consistent with a reference to some genus of Ciborioideae. The asci and spores, however, are not like those of good species of *Rutstroemia* and so much resemble those of the preceding and following species that it seems best to place *P. uleana* here also. The question of its true generic position may profitably be reopened when, if ever, it is recognised again and its relationship to its host elucidated.

***Helotium caracassensis* Dennis spec. nov.**

Ascomatibus superficialibus, cyathoideo-stipitatis, disco plano dein convexo, albidulo, sicco argillaceo, usque ad 2 mm. diam., stipite cylindraceo, brunneo, pruinoso, 2 mm. longo; excipulo prosenchymatico contexto, ascis cylindraceo-clavatis, octosporis, J^+ , $50-60 \times 4-5\mu$, sporidiis distichis, fusiformibus, rectis, utrinque uniguttatis, hyalinis, $5-7 \times 1.5-2\mu$; paraphysibus filiformibus. In foliis putridis, Caracas, Venezuela, *Dennis* 370 (Typus). Fig. 33.

This seems sufficiently separated from *H. phlebophorum* by its larger size, convex disc, lighter colour when dried and especially by the different excipular structure, which is shown by quite small specimens, comparable with the latter in size. The thinwalled hyphae, parallel in the stalk and loosely woven in the hypothecium, become closely packed and rather short-celled in the excipulum, where they lie at a very low angle to the surface. The superficial hyphae, $3-4\mu$ thick, run out into obtuse, thinwalled, cylindrical, downy hairs $15-20 \times 3\mu$, which give the pruinose appearance to the receptacle.

The type collection of *Helotium alboatrum* P. Henn., with ascospores $10-12 \times 5-7\mu$, on dead leaves from Santa Catharina, Brasil, must be presumed lost with the Berlin herbarium. *H. angelense* Starb., on leaves in Rio Grande do Sul, is evidently quite distinct in its yellowish apothecia, black base to the stalk and large ascospores, $12-15 \times 3-4\mu$.

***Helotium atrosubiculatum* Seaver et Waterston in Mycologia 32, 397 (1940).**

As here understood this species is restricted to dead palm fronds and trunks. It is apparently the fungus published by Berkeley and Curtis

from Cuba under the name *Peziza caulicola* Fr. In its blackened substrate, small asci and spores it shows affinity with the european *Sclerotinia lindaviana* Kirschst. on leaves of grasses and sedges, which is certainly no *Sclerotinia*.

Collections seen : Cuba, Wright 648 and as Fungi Cubenses Wrightiani 679 ; Bermuda, on *Archontophoenix alexandrae*, Camden Marsh, 2.X.1938, Seaver & Waterston 71 (Typus) same locality 25.XI.1940 ; Dominica, on palm rachis, Botanic Garden, E. M. Wakefield 83, 30.XI.1920 ; Trinidad, on coconut log, La Victoria, E. M. Wakefield 238, 18.I.1921. Fig. 34.

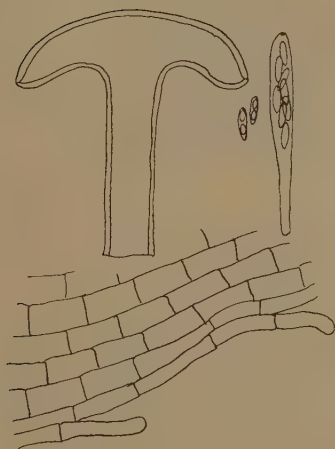


FIG. 33. *Helotium caracasensis*, diagrammatic section $\times 15$, portion of excipulum, ascus and spores $\times 660$.

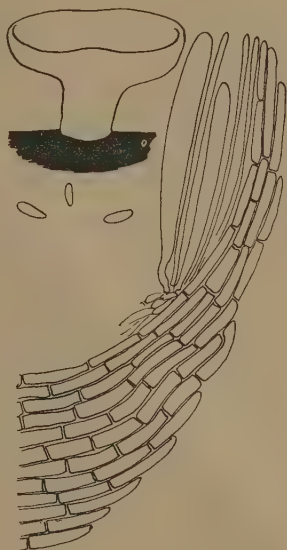


FIG. 34. *Helotium atrosubiculatum* from Wright 648, apothecium $\times 15$, details $\times 660$.

P. Hennings described two other small-spored species on palms in Santa Catharina, Brasil viz : *H. disseminatum* with ascospores $5-7 \times 1-1.5\mu$ and *H. blumenaviense* with ascospores $9-11 \times 1.5-2\mu$. Judging by the diagnoses neither was identical with *H. atrosubiculatum* and both must be presumed lost with the Berlin Herbarium.

Helotium leucopse (Berk. et Curt.) Le Gal, Discom. de Madagascar, 335 (1954).

Peziza leucopsis Berk. et Curt. in J. Linn. Soc. Bot. **10**, 368 (1868).

Phialea leucopsis (Berk. et Curt.) Sacc., Syll. Fung. **8**, 264 (1889).

Apothecia scattered, on bark ; disc 3-6 mm. diam., drying pallid or flesh colour, concave, then flat or slightly reflexed at the margin ; receptacle saucer-shaped, concolorous, smooth, seated on a short, slender darker stalk becoming blackish at the base. Excipulum 40-50 μ thick,

formed of thinwalled compact hyphae 5μ wide, lying almost parallel to the surface ; asci clavate-cylindric, $45-50 \times 4-5\mu$, the minute pore blue in Melzer's reagent ; ascospores biseriate, fusiform-clavate, $7-10 \times 2-2.5\mu$; paraphyses cylindrical 1μ thick, obtuse. Fig. 35 left.

Collection seen : Cuba, Wright 372 (Typus).

Massee (1901) found smaller ascospores, $5-6 \times 1.5-2\mu$, perhaps immature but Berkeley also described them as $\cdot 0002$ inch long, i.e. 5μ . Le Gal described a recent collection from Madagascar as "blanc sale" when fresh.

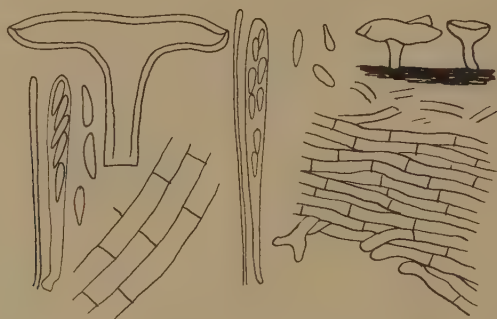


FIG. 35. Left : *Helotium leucopsis*. Right : *H. cupreum*. Habit sketch $\times 2$, diagrammatic section $\times 6$, details $\times 660$.

***Helotium cupreum* Bres. in Hedwigia 35, 295 (1896).**

Disc 4-5 mm. diam., convex, copper-coloured ; receptacle saucer-shaped, on a short slender stalk, concolorous or paler, dark reddish-brown towards the base. Flesh formed of slender, hyaline, loosely woven hyphae ; excipulum about 30μ thick, of compact yellowish hyphae about 3μ wide, lying at a very low angle to the surface ; asci cylindric-clavate, about $60 \times 4\mu$, pore not blue in Melzer's reagent, 8-spored ; ascospores biseriate, clavate, $6-8 \times 2-2.5\mu$; paraphyses very slender, cylindrical, obtuse. On wood. Fig. 35 right.

Collection seen : Brasil, S. Leopoldo, Leg. Rick, in Herb. Bresadola, Stockholm.

According to his notes on the packet Bresadola found ascospores $7-9 \times 2-2.5\mu$. In the typus, from Blumenau, Moller 29c, which I have not seen, the asci were said to be longer, $80-90 \times 4-5\mu$. This and the colour seem the only differences from *H. leucopsis*.

***Helotium umbilicatum* (Le Gal) Dennis, comb. nov.**

Pachydisca umbilicata Le Gal in Rev. de Mycologie (N.S.) 3, 133 (1938).

Apothecia gregarious, on rotten decorticated wood ; disc up to 5 mm. diam., concave, becoming convex with a central dimple at maturity, margin undulating, cream to yellow when fresh, drying ochraceous orange ; receptacle rather thick, on a broad base, concolorous or paler, covered with a minute whitish down. Flesh of tightly woven hyaline hyphae, about 4μ thick, becoming parallel towards the surface and there

replaced by broader, parallel, thinwalled, short-celled hyphae, $7-10\mu$ thick, the surface cells protruding as cylindrical downy hairs. Asci cylindric-clavate, $105-135 \times 7\mu$, 8-spored, pore broad and thin, not blued in Melzer's reagent; ascospores uniseriate fusiform to inequilateral, with two large oil bodies, $11-18 \times 4\mu$; paraphyses cylindrical, obtuse, 2μ thick.

Collection seen: Jamaica, North side of Newhaven Gap, Blue Mts., 26.XII.1949.



FIG. 36. *Helotium crocatum*, apothecium $\times 15$, section of margin, spores, ascus and paraphysis $\times 660$, from Leprieur 439.

Helotium crocatum (Mont.) Le Gal, Discom. de Madagascar, 347 (1954).

Peziza crocata Mont. in Ann. Sci. Nat. Ser. 2, **13**, 207 (1840).

Phialea crocata (Mont.) Sacc., Syll. Fung. **8**, 262 (1889).

Apothecia scattered, superficial on petioles of fallen leaves; disc flat, 1 mm. diam., egg yellow; receptacle saucer-shaped, smooth, lemon yellow, seated on a slender cream coloured stalk. Flesh formed of rather slender parallel hyphae, excipular hyphae almost parallel to the surface, $5-8\mu$ thick; asci cylindric-clavate, $100-125 \times 10\mu$; ascospores \pm biseriate, fusiform or slightly tapering below, $21-27 \times 3\mu$, nonseptate; paraphyses cylindrical, obtuse, 2μ thick.

Collections seen: French Guiana, Sinnamarie, Leprieur 439, authentic material from Montagne; Jamaica, on petioles of *Alchornea latifolia*, Markham Hill, Cinchona, Blue Mts., 25.XII.1949, Dennis J72. Fig. 36.

Helotium miniatum Pat. apud Duss, Champ. Guadeloupe 65 (1903).

Apothecia solitary, erumpent from bark; disc up to 2 mm. diam., red, flat; receptacle thin, saucer-shaped, smooth, soft, seated on a short

stout stalk. Flesh formed of slender hyaline hyphae, becoming parallel towards the surface and margin and there terminating in inflated clavate cells; asci cylindric-clavate, $120-140 \times 10-4\mu$, 8-spored, pore small, outlined blue in Melzer's reagent; ascospores fusiform to inequilateral, $30-36 \times 5.5-6\mu$; paraphyses slender, obtuse, slightly longer than the asci, 2μ thick. The flesh yields a yellow stain in KOH solution. Fig. 37.

Collection seen: Guadeloupe, on *Theobroma*, Pointe Noire, 1902, Duss 608 (Typus).

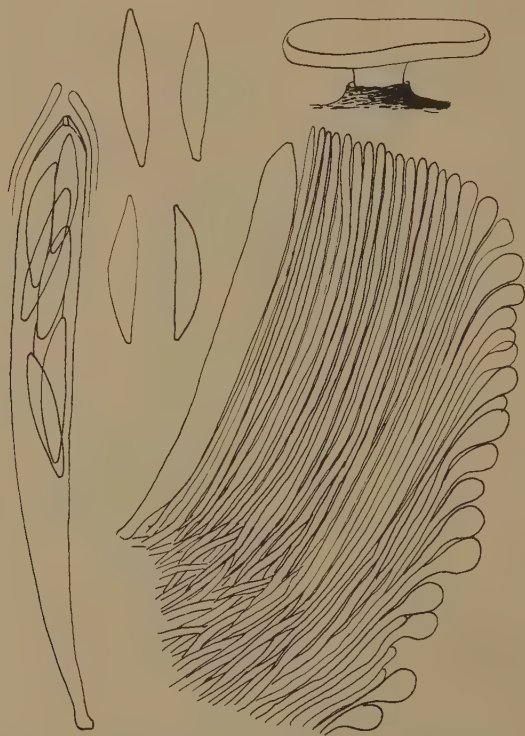


FIG. 37. *Helotium miniatum*, apothecium $\times 15$, details $\times 660$.

***Helotium fuscopurpureum* Rehm** in Hedwigia **39**, 94 (1900).

Apothecia scattered on rotten wood; disc flat, up to 5 mm. diam., "purpureo" according to Rehm, now ochraceous orange; receptacle saucer-shaped, concolorous, becoming ochraceous buff on the rather slender stalk, smooth. Flesh formed of compact rather slender thin-walled hyphae; excipulum of somewhat broader, parallel, shortcelled hyphae, $5-6\mu$ thick, the surface cells somewhat clavate; asci cylindric-clavate, $140-150 \times 12-14\mu$, 8-spored, pore blue in Melzer's reagent; ascospores fusiform to inequilateral, biseriate, $29-31 \times 5-7\mu$; paraphyses slender, obtuse, $2-3\mu$ thick. The flesh yields a yellow stain in KOH solution. Fig. 38.

Collection seen : Brasil, Serra dos Orgaos, Ule 2500, Oct. 1896 (Typus) in Herb. Stockholm ; Saõ Leopoldo, Leg. Rick in Herb. Bresadola at Stockholm sub nom *H. aurantiorubrum* Bres. forma *camerunense* P. Henn.

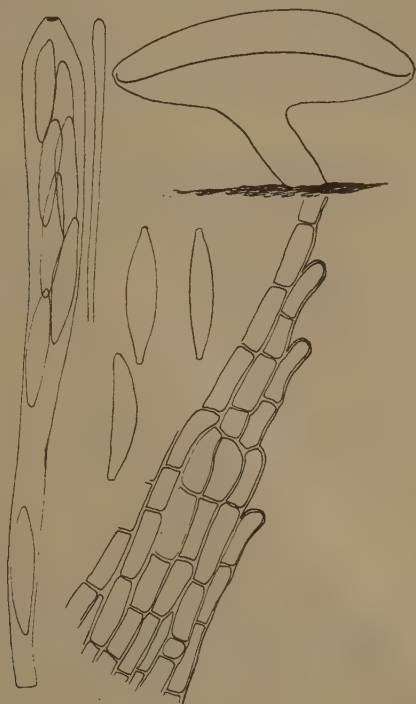


FIG. 38. *Helotium fuscopurpureum*, apothecium $\times 15$, details $\times 660$.

I have not seen the typus of *H. aurantio-rubrum* Bres. 1896, from Blumenau, Brasil, A. Möller 29b, but from the diagnosis it may well afford an earlier name for the above species. In hymenial characters this so closely resembles *H. miniatum* that the possibility of their proving to be states of a single species should be borne in mind by collectors, especially as Rehm's fungus was said to be purple when fresh. There is, however, considerable difference in the present condition of the excipular hyphae in the specimens of these two fungi examined.

Excluded Species

Helotium miserum Berk. & Curt. in J. Linn. Soc. Bot. 10 p. 369, 1869.

Apothecia scattered amongst mosses on bark or soil. Disc about 0.5 mm. diameter, whitish, drying gray, convex, without a rim ; receptacle saucer-shaped, concolorous, seated on a short stout stalk which arises from a weft of mycelium enclosing clusters of unicellular algae. Flesh composed throughout of almost parallel colourless hyphae $1-2\mu$ thick. Asci clavate, $65-70 \times 12\mu$, 8-spored, thickwalled, rounded above, stained deeply blue throughout in Melzer's reagent ; ascospores irregu-

larly biseriate, elliptical, 1-septate, hyaline, $13-14 \times 5\mu$; paraphyses very slender, branched, 1μ thick, colourless. Fig. 39.

Cuba : Wright 456, Typus.

This is evidently a "half-lichen" akin to *Epiglia gloeocapsae* Boud. from which it differs in its septate spores. The iodine reaction of *E. gloeocapsae* is unknown but the asci of the very similar "*Helotium uvidulum* Karst." are unstained in Melzer's reagent.

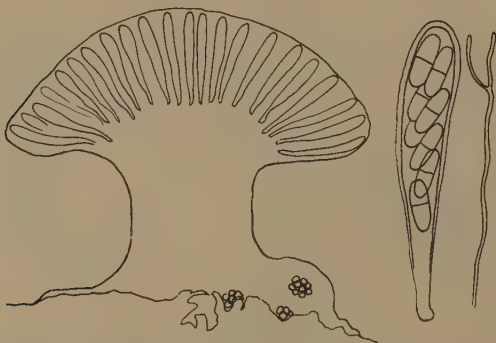


FIG. 39. *Helotium miserum*, diagrammatic section $\times 350$, showing pockets of algal cells at the base, ascus and paraphysis $\times 660$.

Helotium rhytidodes Berk. & Curt. in J. Linn. Soc. Bot. 10 p. 369, 1869.

This yellow, sessile, corticolous fungus 5 mm. across is constructed throughout of intricately woven hyphae $3-4\mu$ thick, becoming parallel at the surface and margin. Asci measure $160 \times 12\mu$ with uniseriate spores $16-21 \times 8-11\mu$, the paraphyses are closely septate, 3μ thick, not thickened at the tip. Most probably this is an operculate species.

Helotium marmolense Speg. from Buenos Aires is an *Orbilis*. (Fig. 6G).

Discinella Boud. in Bull. Soc. mycol. France I, 112 (1885).

Discinella boudieri (Quél.) Boud. var. **spadicea** Boud. Discom. d'Europe 96 (1907).

Jamaica, on soil, Cinchona, J18, 19.XII.1949.

This is another north temperate element in the Blue Mountains flora.

Belonidium Mont. & Dur., Exploration d'Algerie, Atlas p. 11, 1846.

The type species, *B. aeruginosum* Dur. & Mont., has never been adequately described. It was on dead leaves of *Quercus ilex* in Algeria and may probably not prove congeneric with the fungi subsequently referred to *Belonidium* by other authors. The name is used here in the traditional sense, to include *Helotium*-like fungi with more than one septum in their ascospores.

The following three species from the West Indies fall in that category :

- A. Spores considerably more than 30μ long, on palms . *B. sclerogenum*
- B. Spores $25-30 \times 5\mu$, on rotten wood or debris :
 - a. Apothecia with well defined stalks *B. hirtipes*
 - b. Apothecia sessile *Massea quisquiliarum*

Belonidium sclerogenum (Berk. & Curt.) Sacc., Syll. fung. **8**, 497 (1889).

Peziza sclerogena Berk. & Curt. in J. Linn. Soc. Bot. **10**, 369 (1869).

Belonium sclerogenum (Berk. & Curt.) Seaver, N. Amer. Cup Fungi (Inop.) **173** (1951).

Apothecia superficial, solitary. Disc up to 1 mm. diameter, flat, ochraceous ; receptacle saucer-shaped on a short stout stalk, smooth, concolorous, soft. Flesh of compact thinwalled hyphae about 3μ thick, parallel in the stalk, interwoven in the hypothecium ; excipulum sharply differentiated, of thinwalled, shortcelled hyphae up to 14μ thick, lying at a very low angle to the surface, the terminal cells slender, adpressed, with oily contents. Asci cylindrical, the pore deep blue in Melzer's reagent, at least $110 \times 13\mu$, probably considerably longer at maturity ; ascospores biserial, fusiform or often inequilateral, tardily 3-septate, hyaline, $32-39 \times 5-6\mu$; paraphyses slender, cylindrical.

On palm petioles, Cuba, *Wright* 754, typus. Fig. 40.

Belonidium hirtipes *A. L. Smith* in J. Linn. Soc. Bot. **35**, 14 (1901).

Apothecia scattered, superficial, on rotten decorticated wood. Disc up to 2 mm. across, flat or slightly concave, ochraceous, often becoming blackened on drying ; receptacle saucers shaped, concolorous, seated on a cylindrical stalk up to 2 mm. high and 0.5 mm. thick, its lower part clothed with erect hyaline hairs about 3μ thick. Flesh of compact parallel hyphae about 3μ thick, more loosely woven in the hypothecium ; excipulum of shortcelled hyphae $10-12\mu$ broad, lying at a very low angle to the surface and terminating in slender, elongated, adpressed cells. Asci cylindric-clavate, $140 \times 12\mu$, broadly rounded above, the pore not blued in Melzer's reagent, 8-spored ; ascospores biserial, fusiform, usually inequilateral, 3-septate, with a large oil body in each cell, $25-30 \times 5\mu$; paraphyses cylindrical, obtuse, 2μ thick. Fig. 41.

Collections seen : Venezuela, on sodden wood, Rancho Grande, Maracay, 19.XI.1949, *Dennis* 399 ; Dominica, head of Castle Bruce River, 18.II.1896, *W. R. Elliott* 1443, Typus, in Herb. Brit. Mus.

Miss Lorraine Smith's diagnosis was somewhat misleading in giving the spore length as $20-25\mu$. Examination of her own slide preserved at the British Museum shows it to carry ascospores $25-30 \times 5\mu$, exactly like those of the Venezuelan material. Very possibly *B. lasiopodium* Pat. 1900, also from Venezuela, is this fungus but he gave the spore size as $30 \times 6-8\mu$ and his material cannot at present be found for the measurements to be checked.

B. hirtipes is obviously very near *B. sclerogenum* but in repeated examinations no ascospores over 30μ long have been found in the former. This,

combined with the apparent difference in iodine reaction and the different substrate, makes it inadvisable to unite them at present. Structurally both are *Helotiums* with 3-septate ascospores but *B. hirtipes* will require a new specific epithet if transferred to *Helotium* as there is already an *H. hirtipes* Sacc. & Mouton.

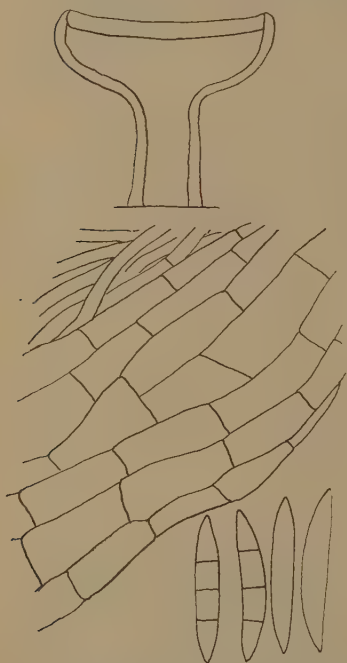


FIG. 40. *Belonidium sclerogenum* from Wright 754, diagramatic section $\times 30$, portion of excipulum and spores $\times 660$.

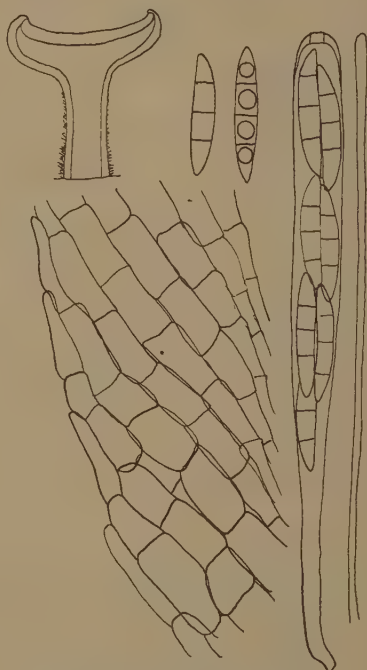


FIG. 41. *Belonidium hirtipes* from Dennis 399, diagramatic section $\times 15$, details $\times 660$.

Peziza quisquiliarum Berk. & Curt., the type species of *Massea* Sacc., on woody debris in Cuba, differs principally in being sessile. The type collection, Wright is extremely scanty and in poor condition; it does not merit redescription until fresh sessile collections with ascospores $25-30 \times 5\mu$ become available for comparison. At present *P. quisquiliarum* is known only from the type collection, specimens from Carlisle so named by Massee are in fact an unrelated operculate fungus with ascospores $16-18 \times 10-11\mu$.

CIBORIOIDEAE

Rutstroemia Karst., Myc. Fenn. **1**, 108 (1871) emend. White, Lloydia **4**, 169 (1941).

Rutstroemia macrospora (Peck) Kanouse in Canad. J. Res. **18**, 547 (1940).

Helotium macrosporum Peck in Ann. Rept. N.Y. State Mus. **26**, 82 (1874).

This species has been fully described by White (1941), who cites an extensive synonymy. It is easily recognised by its gray apothecia and

large fusoid spores, $24-29 \times 6-7\mu$, in asci up to $190 \times 14\mu$; on rotting wood in forests.

W. Indian material seen: Jamaica, N. side of Newhaven Gap, Blue Mts., 26.XII.1949, *Dennis* J80. According to White the fungus is common and widely distributed in North America from Manitoba and Ontario to S. Carolina and Louisiana. It thus belongs to the North Temperate fungus flora so well represented at high altitudes in the Blue Mts.

Ciboria argentinensis Speg., on *Celtis* at Tucuman, belongs to the operculate genus *Cookeina*. *Ciboria cespitosa* Seaver, from Porto Rico, is *Ionomidotis nicaraguensis* Durand, as already admitted by Seaver (1951).

ENCOELIOIDEAE

Cordierites Mont. in Ann. Sci. Nat. Ser. 2, 14, 330 (1840).

Cordierites guyanensis Mont. loc. cit. p. 331.

Examination of the type collection, Leprieur 383, kindly loaned from Paris, and of a recent good gathering by Prof. Baker from the Amazonian provinces of Columbia, shows that this, the original species of *Cordierites*, does not yield a purple stain with KOH solution. Hence *Cordierites* and *Ionomidotis* are easily distinguishable in spite of the branched stalk of *I. sprucei* (Berk.) Durand. The ascus tip is unstained by Melzer's reagent.

Collections seen: French Guiana, Leprieur 383, November 1837; Colombia, Vaupes, Caño Unguya, Rio Apaporis, R. E. D. Baker 15, 4.IX.1952.

Encoelia (Fr.) Karst. Myc. Fenn. 1, p. 18 (1871).

Encoelia heteromera (Mont.) Nannf. in Trans. Brit. mycol. Soc. 23, 239 (1939).

Peziza heteromera Mont. in Ann. Sci. Nat. Ser. 2, 13, 206 (1840).

Midotis heteromera (Mont.) Fr., Summa Veg. Scand. 362 (1849).

Midotis verruculosa Berk. et Curt. in J. Linn. Soc. Bot. 10, 370 (1868).

Midotis regularis Cke. et Phill. in Grevillea 9, 101 (1881).

Cenangium leoninum Cke. et Massee in Grevillea 21, 72 (1893).

Dermatea aureo-tincta Rehm in Hedwigia 39, 84 (1900).

Dermatea pulchra Starback in Arkiv for Bot. (2), 6 (1904).

Apothecia solitary or in small clusters, disc concave, 1-2 cm. diam., claret-brown; receptacle cupshaped with a short stout base and prominent incurved margin, the larger apothecia somewhat asymmetrical, surface scurfy to verrucose, ochraceous-tawny. Flesh of tightly woven hyphae about 4μ thick, excipulum about 100μ thick, a pseudoparenchyma of thinwalled isodiametric cells $10-15\mu$ diameter, yielding a yellow solution in KOH; asci clavate, $110-115 \times 8\mu$, 8-spored, rounded above, the pore not blue in Melzer's reagent; ascospores uniseriate, elliptical, inequilateral or sometimes slightly reniform, $8-10 (-11) \times 3-3.5\mu$; paraphyses obtuse, $2-3\mu$ thick. On dead wood. Fig. 42.

Collections seen: Cuba, ex herb. Montagne in herb. Berkeley; *C. Wright* 580 in herb. Berk. as *Cordierites lateritia*; *C. Wright* 663, as *M.*

verruculosa ; Brasil, Rio de Janeiro, Glaziou 9162 (Typus of *M. regularis*) ; Glaziou 8539 ; Parque Nacional do Serra dos Orgaos, Terezopolis, G. C. Ainsworth 20.VIII.1950 ; São Leopoldo, Leg. Rick.

According to Nannfeldt, *Midotis patella* Fr., from Mexico, is probably another synonym of *E. heteromera*.

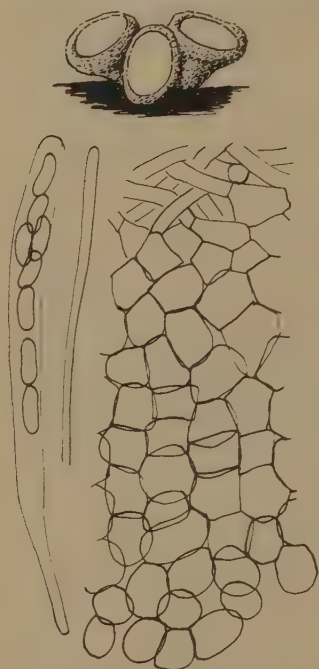


FIG. 42. *Encoelia heteromera*. Habit sketch natural size, ascus, paraphysis and portion of excipulum in section $\times 660$.

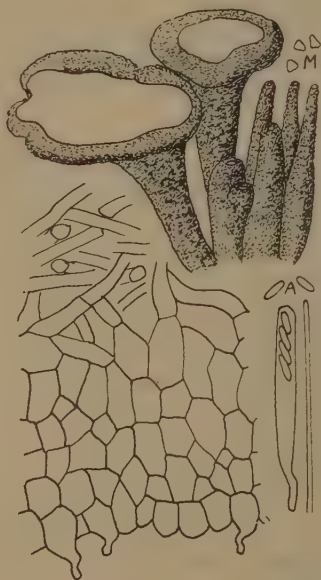


FIG. 43. *Encoelia infundibuliformis*. Habit sketch $\times 6$, details of excipulum, ascus and spores $\times 660$. A, ascospores ; M, microconidia.

***Encoelia infundibuliformis* (Durand) Dennis, comb. nov.**

Midotis infundibuliformis Durand in Proc. Amer. Acad. Arts Sci. **59**, 7 (1923).

Apothecia arising from a small erumpent stroma which also bears clusters of conical or cylindrical pycnidia ; disc concave, pale pinkish buff, up to 3 mm. long ; receptacle saucer-shaped with a long, cylindrical, excentric stalk, cinnamon-brown, furfuraceous. Flesh formed of compactly woven hyaline hyphae 3μ thick, excipulum a pseudoparenchyma of polygonal cells, $7-10\mu$ wide, with thin brown walls, surface cells running out into very short, slender, downy hairs ; asci cylindrical, rounded above, 8-spored, $45-55 \times 4-5\mu$, pore not blued in Melzer's reagent ; ascospores cylindrical, $5-6 \times 2\mu$; paraphyses cylindrical, 1μ thick. Pycnidia cylindrical or conical with a small apical pore, coloured like the ascophore and with similar flesh, pycnosporos more or less triangular brownish microconidia, 2μ across. On logs. Fig. 43.

Collection seen : Trinidad, Arima, leg. Miss D. Kong, 28.XI.1949, Dennis 392.

Encoelia lobata (Starb.) Dennis, comb. nov.

Helotium lobatum Starb. in Bih. K. Svensk Vet.-Akad. Handl. 25 (3) no. 1, 5 (1899).

Apothecia clustered, erumpent from bark ; disc lobed, up to 5 mm. diam., convex, margin conspicuously lobed ; receptacle flattened, paler than the disc, with a very short central stalk. Excipulum formed of 6-7 μ layers of prismatic thinwalled cells about 10 μ wide with yellowish-brown walls, superficial cells hyaline, protruding as unicellular clavate hairs sparingly incrustated with short crystalline rods ; flesh thick, of very loosely woven hyphae 4 μ thick ; asci clavate with slender stalks, 8-spored, 45-55 \times 5 μ , pore not now blued by Melzer's reagent though Starback found them J- ; ascospores irregularly biseriata, slightly reniform, rounded at each end, 5 \times 1.5 μ ; paraphyses slender, obtuse, branched below, 1 μ thick. On trunks and branches in forest.

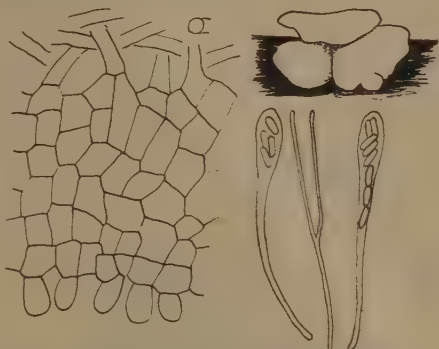


FIG. 44. *Encoelia lobata*. Habit sketch \times 2, details of excipulum, asci and paraphysis \times 660.

Collections seen : Brasil, Rio Grande do Sul, Santa Angelo pr. Cachoeira, 4.II.1893, G. A. Malme 234 (Typus) ; Ijuhy, 30.III.1893, G. A. Malme 310 ; Saõ Leopoldo 1907, leg. Rick, as Theissen, Decades fungorum brasiliensium 139, all Herb. Stockholm. Fig. 44.

Midotiopsis P. Henn. in Hedwigia 41, 17 (1902).

Midotiopsis jamaicensis Dennis, spec. nov.

Ascomatibus coriaceis, superficialibus, excentrice cupulatis, 4 cm. diametro, extus atro-brunneis, furfuraceis, venosis, brevissime stipitatis, disco atro-brunneo ; ascis cylindraneo-clavatis, 8-sporis, 60-65 \times 4 μ ; sporis monostichis, globosis, hyalinis, levibus, 3 μ ; paraphysibus filiformibus, obtusis, 1.5 μ crassis. Hab. ad truncos putrescentes, in silva primaeva, High Peak, Blue Mountains, Jamaica, Dennis J55, Typus. Fig. 45.

This handsome species has the usual encoelioid structure, with flesh of tightly woven, somewhat agglutinated, thickwalled hyphae and an excipulum 50-60 μ thick, formed of almost isodiametric cells with thin dark-brown walls, passing at the surface into short, clavate, downy, brown hairs. The hyphae of the flesh become more loosely woven towards the hymenium beneath which is a hypothecium of thinwalled compact hyphae. In 10% KOH solution the tissue yields a purple stain. In

this it agrees with *Ionomidotis* Durand and also with Leprieur 885, the second collection referred by Montagne to *Cordierites guyanensis* Mont. From the type species of *Midotiopsis*, viz *M. bambusicola* P. Henn. from south Brasil, the Jamaican fungus differs in its much greater size, dark colour and in not growing on bamboo. Henning's fungus was described as "extus subluteis, granuloso furfuraceis -- -- disco convexo ochroleuco". Von Höhnelt reexamined it and confirmed that it "gut beschrieben und richtig eingereiht ist". Le Gal (1954), who had the species from Madagascar, thought the asci probably operculate in spite of their small size.

As regards *Ionomidotis* Durand the reader is referred to the admirable treatment by Durand (1924), to which I have nothing to add.



FIG. 45. *Midotiopsis jamaicensis*. Habit sketch natural size, ascus, paraphysis, tip of discharged ascus and portion of excipulum in radial section $\times 660$.

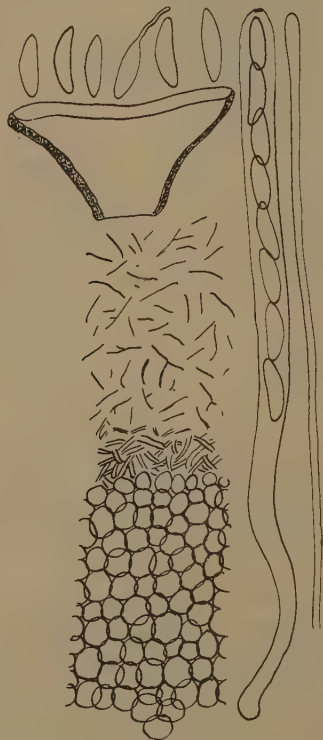


FIG. 46. *Coryne sarcoides* from Wright 189, diagrammatic section showing the gelatinous flesh and thin parenchymatous excipulum $\times 3$, details $\times 660$.

OMBROPHILOIDEAE

***Coryne* Tul. Sel. Fung. Carp. 3, 190 (1865).**

***Coryne sarcoides* (Fr.) Tul. Sel. Fung. Carp. 3, 190 (1865).**

Bulgaria sarcoides Fr. Syst. myc. 2, 168 (1822).

Bulgaria similis Berk. et Curt. in J. Linn. Soc. Bot. 10, 370 (1868).

Ombrophila similis (Berk. et Curt.) Sacc., Syll. Fung. **8**, 614 (1889).

West Indian collection seen : Cuba, *C. Wright* 189, Typus of *B. similis*. I am unable to separate this from European material of *C. sarcoides*, from which Berkeley thought it differed in having spores only $10 \times 5\mu$. I find the ascospores to measure $13-17 \times 4\mu$. Le Gal reached a similar conclusion by examination of the Paris example of Fungi Cubenses Wrightiani 708. Fig. 46.

***Ombrophila* Fr. Summa Veg. Scand. 357 (1849).**

***Ombrophila microspora* (Ell. et Ev.) Sacc. et Syd., Syll. Fung. **14**, 802 (1899).**

Coryne microspora Ell. et Ev. in Bull. Torrey Bot. Club **24**, 282 (1897).

Ombrophila pellucida A. L. Smith in J. Linn. Soc. **35**, 14 (1901).

Ombrophila blumenaviensis P. Henn. in Hedwigia **41**, 20 (1902).

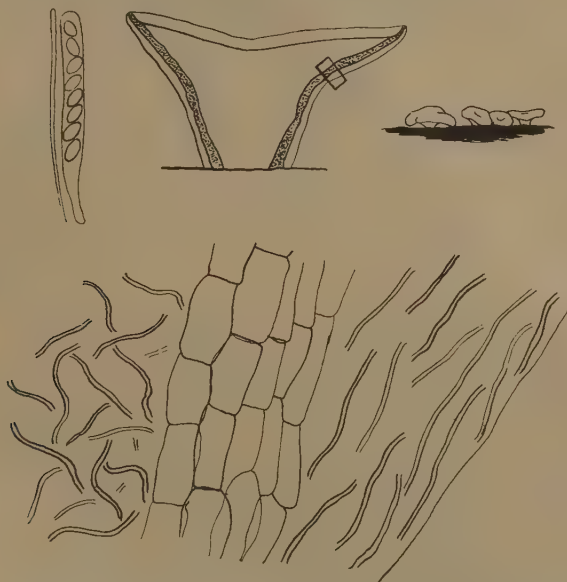


FIG. 47. *Ombrophila microspora*. Habit sketch natural size, diagramatic section with parenchymatous tissue stippled $\times 3$, ascus and portion of excipulum indicated by rectangle $\times 660$.

Apothecia gregarious, superficial, on bark. Disc usually slightly convex when moist, sometimes slightly umbilicate, up to 12 mm. diameter, pale greyish brown with lilaceous tints, drying purplish-brown; receptacle saucer-shaped with a short stout stalk, smooth, slippery. Flesh very soft, 3-layered, central mass hyaline, composed of very slender hyphae $1-2\mu$ thick, sparsely and irregularly permeating colourless mucilage, median zone brown, composed of about 5 layers of large prismatic cells with thin brown walls, some as much as $150 \times 25\mu$ when fresh but appearing much smaller in sections made from soaked up dried

material, surface layer of slender hyaline hyphae $1-2\mu$ thick, lying almost parallel and at a very low angle to the surface, in colourless mucilage. This mucilaginous coating may be about 50μ thick or may be much eroded and difficult to detect without microtome sections. Asci cylindric-clavate, 8-spored, $50-55 \times 5-6\mu$ rounded above, pore small and thin but probably blued on the inner surface in Melzer's reagent; ascospores mostly uniseriate, elliptical or inequilateral, $5-7 \times 2.5-4\mu$; paraphyses cylindrical, obtuse, $2-2.5\mu$ thick, with oily contents. Fig. 47.

Collections seen: Trinidad, outside the cave mouth, Cerro del Aripo, 23.X.1949, *Dennis* 233; Venezuela, on log in the stream, Rancho Grande, Maracay, 19.XI.1949, *Dennis* 233A; Dominica, Castle Bruce River, 4 Feb. 1896, *W. R. Elliott* 1466, Typus of *O. pellucida* in Herb. Brit. Mus.; Canada, Typus of *O. microspora* in Herb. New York Bot. Gard.

The typus of *O. blumenaviensis*, now presumed lost with the Berlin Herbarium, was from Blumenau, Sta. Catharina, south Brasil, March 1892. Cash (1937) has reported the species from a collection by G. W. Martin in the Sierra Nevada de Santa Marta, Colombia, but neither she nor Hennings gave any details of the anatomy.

Structurally *O. microspora* is indistinguishable from the well-known european *O. pura* (Pers. ex Fr.) Petrak. They may be the same species but the latter, as known in England, tends to have larger apothecia and appears restricted to logs of *Fagus*.

Ombrophila patellarioides Karst., from Brasil, is a rudimentary lichen with unicellular blue-green algae. It differs from *Helotium miserum* in having a brown zone in the flesh, longer asci, $125 \times 12\mu$, and continuous ascospores.

Calloriopsis Syd. in Ann. mycol. **15**, 254 (1917).

Calloriopsis gelatinosa (Ell. et Mart.) Syd. op. cit.

Peziza (*Mollisia*) *gelatinosa* Ell. et Mart. in American Naturalist **17**, 1283 (1883).

Orbilbia gelatinosa (Ell. et Mart.) Sacc., Syll. Fung. **8**, 624 (1889).

Coryne gelatinosa (Ell. et Mart.) Rehm in Ann. mycol. **5**, 518 (1907).

Apothecia scattered on mycelia of Meliolineae, sessile, disc convex, up to 500μ diam., pale ochraceous when dry, receptacle saucershaped, smooth, concolorous, gelatinous throughout. Hypothecium and central core above the small base composed of slender closely packed hyphae, excipulum $40-50\mu$ thick, of subparallel rather distant hyphae about 1μ wide, hyaline, lying almost at right angles to the surface, curving upwards somewhat at the margin, embedded in a colourless gelatinous matrix; asci clavate, apex not blued by Melzer's reagent, 8-spored, about $45 \times 10\mu$; ascospores irregularly biseriate, narrowly elliptical, somewhat pointed below, 3-4-septate, $12-16 \times 4-5\mu$; paraphyses hyaline, filiform, 1μ thick, occasionally forked, only slightly enlarged at the obtuse tip, in a colourless gelatinous matrix not stained by Melzer's reagent. Fig. 48 right.

Collections seen: Trinidad, on *Irenina glabroides* on *Stachytarpheta cayennensis*, St. Augustine, R. E. D. Baker, 18.II.1947; Venezuela, on

Meliola tortuosa on *Piper marginatum*, El Limon, Puerto La Cruz, H. Sydow, 10.1.1928, Fungi exotici exs. 839; Porto Rico and Cuba, numerous collections at New York Bot. Gard. Also from Sierra Leone, Java (as *Coryne meliolicola* (P. Henn) von Höhn,) and reported by Sydow from Philippine Is.

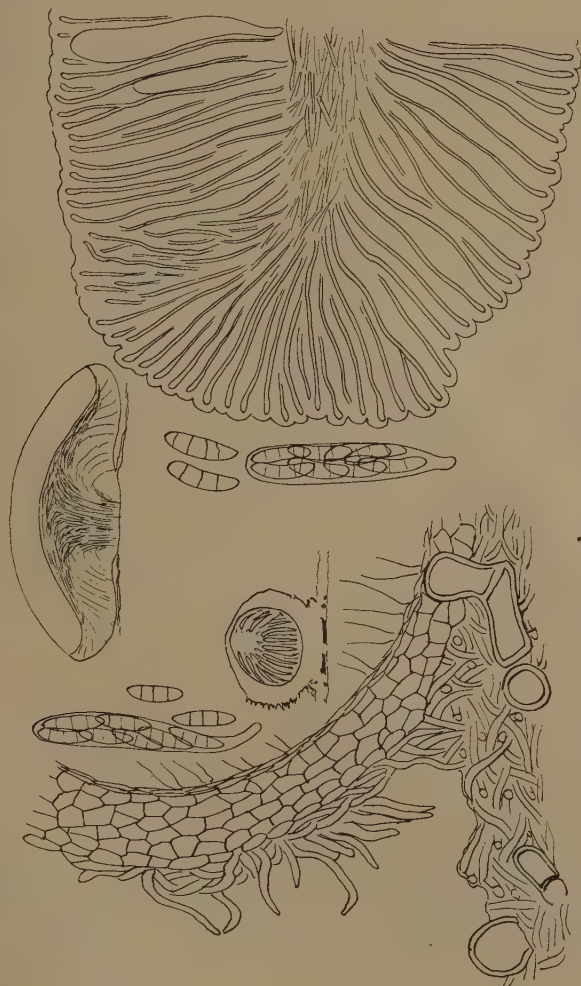


FIG. 48. On left Montagne's material of "*Peziza leucorrhodina*" contrasted with, right, *Callorhiza* *gelatinosa* from Baker. Diagrammatic section $\times 50$, details $\times 660$.

Unfortunately the type collection of *P. gelatinosa* cannot now be traced. Seaver (1951) cited also *Trichobelonium albosuccineum* Rehm, which from the description sounds likely enough but to refer the species to *Trichobelonium*, typified by *Peziza retincola* Rab., is absurd. *Peziza leucorrhodina* Mont., based on a collection on Malvaceae from Cuba, is commonly regarded as the earliest name for the fungus but the material sent by Montagne to Berkeley under that name is Hypocreaceous (Fig. 48 left).

Possibly it was this that Petrak (1927) studied from Costa Rica and referred to the *Ascoloculares*. His description indicates a fungus with structure unlike that detailed above or described by Rehm, Sydow and von Höhnelt.

GEOGLOSSACEAE

Only two genera of this family are yet known from the West Indies, viz. *Trichoglossum*, with black setae in the hymenium, and *Geoglossum* without such setae. The species are all black and cannot be separated by macroscopic characters.

***Trichoglossum* Boud.** in Bull. Soc. myc. France **1**, 110 (1885).

The species of this genus are remarkably uniform in appearance and are separable only by the number of spores in the ascus, 4 or 8, and the number of septa in the mature ascospores. The collections from Trinidad cited below were all made together from a single bamboo plantation. In the field they appeared uniform but they fall into four categories on spore septation alone. In another group of organisms one might well regard them as a hybrid swarm between a 15-septate and a 7-septate species but the possibility of hybridisation in Geoglossaceae has yet to be demonstrated. An excellent key to the known species will be found in Nannfeldt (1942) and need not be repeated here. All but *T. velutipes* have 8-spored asci.

***Trichoglossum hirsutum* (Pers. ex Fr.) Boud.** Hist. Class. Discom. Europe, 86 (1907). Spores regularly 15-septate. Fig. 49 A.

Trinidad, Bamboo plantation, St. Joseph, 20.IX.1949, 2 sporophores. Bermuda, under ferns, Devonshire Marsh, June 1873, from Challenger Exp. in Herb. Berk. Durand (1921) recorded the species from Goyaz, Brasil.

***Trichoglossum octopartitum* Mains** in Amer. J. Bot. **27**, 325 (1940).

Spores regularly 7-septate, $100-140 \times 6\mu$. Fig. 49 D.

Trinidad, Bamboo plantation, St. Joseph, 20.IX.1949, 2 sporophores. Jamaica, Forest north of Morce's Gap, Blue Mts., Dec. 1949.

The type collection, not seen, was from British Honduras but Dr. Mains has kindly confirmed the identification of the Jamaican material. The much older *T. walteri* (Berk.) Durand differs only in its slightly shorter spores, $75-100\mu$ long. It may confidently be sought in the caribbean region as it is already known from Brasil and eastern North America. (Fig. 49 E).

***Trichoglossum variabile* (Durand) Nannfeldt** in Arkiv. f. Bot. **30A**, 64 (1942).

T. hirsutum f. *variabile* Durand in Ann. mycol. **6**, 437 (1908).

Spores varying from 8 to 14-septate, mostly 11-septate. Fig. 49 B.

Trinidad, Bamboo plantation, St. Joseph, 20.IX.1949, 22 sporophores. Jamaica, Cinchona, J88, December 1949.

Trichoglossum velutipes (Peck) Durand in Ann. Myco. 6,434 (1908).

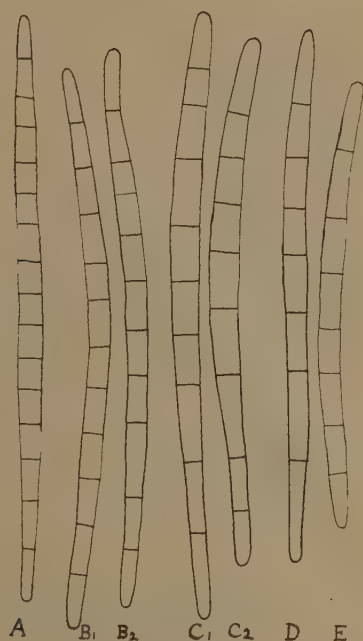
Spores mainly 11-septate like those of *T. variabile* but asci only 4-spored.
Jamaica, Cinchona, J89, December 1949.

Trichoglossum wrightii (Durand) Durand in Mycologia 13, 187 (1921).

Spores 8–9-septate. Fig. 49 C.

Trinidad, Bamboo plantation St. Joseph, 20.IX.1949, 1 sporophore ;
Cuba, C. Wright ; Bermuda, South Shore, 10.X.1940, Seaver & Waterston
178.

FIG. 49. Ascospores of the West Indian species of *Trichoglossum* $\times 660$. A, *T. hirsutum*. B, *T. variabilis*. C, *T. wrightii*. D, *T. octopartitum*. E. *T. walteri*.



There is no material of *Geoglossum* Pers. ex Fr. at Kew from the West Indies proper but the following species, readily identifiable in Nannfeldt (1942), have been recorded from Bermuda : *G. fallax* Durand, *G. glutinosum* Pers. ex Fr., *G. nigratum* Cke., *G. pumilum* Wint and *G. pygmaeum* Ger. *G. pumilum* is already known from Brasil and Porto Rico.

LECANORALES

The following key includes only the black non-lichenised genera received at Kew from the West Indies :

A. Asci thinwalled, ascospores brown :

1. Ascus tip not blue in Iodine, ascospores nonseptate . *Catinella*

2. Ascus tip blue in Iodine, ascospores septate :
- a. Ascospores 1-septate *Karschia*
 - b. Ascospores predominantly 3-septate *Leciographa*
- B. Ascus thickwalled, bitunicate, tip not blue in Iodine, ascospores hyaline, multiseptate *Patellaria*

Catinella Boud. Discom. d'Europe, 150 (1907).

Catinella olivacea (Batsch ex Fr.) Boud. op. cit.

Peziza olivacea Batsch ex Fr. Syst. Myc. **2**, 142 (1822).

Peziza viridi-atra Berk. et Curt. in J. Linn. Soc. Bot. **10**, 369 (1868).

Pezicula viridi-atro (Berk. et Curt.) Sacc., Syll. Fung. **8**, 315 (1889).

Chlorosplenium viridiatrum (Berk. et Curt.) Masee in J. Linn. Soc. Bot. **35**, 101 (1901).

Bulgariella argentinensis Speg. in An. Mus. Nac. Buenos Aires **19**, 454 (1909).

This common European and North American fungus has been fully described by Boudier (1907) and especially by Durand (1922), who should be consulted for the full and extensive synonymy. Both authors placed it near *Karschia*. Nannfeldt (1932) removed *Catinella* to the Dematiaceae but persons unfamiliar with the species are likely first to seek it in the neighbourhood of *Karschia* so the traditional disposition has been reverted to here. The ascospores measure $6.8 \times 3.4\mu$, and are biguttulate, rather tardily becoming pale brown. Durand laid stress on the deep violet reaction of the excipulum with KOH.

Tropical American collections seen : Cuba, *C. Wright* 369, Typus of *P. viridi-atra* ; Argentina, Rio Colorado, Oran, Salta, 7.II.1906, *C. Spegazzini*, Typus of *B. argentinensis*.

C. elastica (Pat. et Gaill.) Durand from Venezuela is said to differ only in its much larger ascospores, $13-15 \times 6-7\mu$.

Karschia Koerber, Parerga Lichenologica 459 (1865).

Karschia stygia (Berk. et Curt.) Masee var. **tenuispora** Dennis, var. nov.

Apothecia superficial, gregarious on decorticated wood. Disc 1 mm. across, flat, without a rim, black ; receptacle saucers shaped with a broad thick base, smooth, black. Flesh a pseudoparenchyma of rather small cells with a tendency to be elongated vertically except in the hypothecium, dark olive gray in water, reddish-purple in lacto-phenol ; excipulum not very sharply differentiated, about $80-90\mu$ thick, formed of larger cells $10-18 \times 6-8\mu$ and hence appearing lighter coloured in radial sections, cells thinwalled, elongated towards the surface, outermost isodiametric and almost black. Asci clavate, $45-60 \times 9-11\mu$, wall thickened at the apex and there stained dark blue in Melzer's reagent, 8-spored ; ascospores biserial, narrowly elliptic-fusiform, brown, 1-septate, $10-13 \times 2.5-3\mu$, not constricted at the septum ; paraphyses slender, enlarged to $3-4\mu$ at the clavate rounded tip, longer than the

asci, firmly agglutinated and covered by a thin brown epithecial crust. A thin stratum of slender blackish hyphae covers the wood between adjacent apothecia but there is no indication of an algal layer; for those who do not regard lichens as a class distinct from fungi, however, *Karschia* is a synonym of the lichen genus *Buellia*.

Venezuela: on logs, Country Club, Rio Chacaito, Caracas, 18.XI. 1949, Dennis 362. A typo differt sporidia angustiora $2.5\text{--}3\mu$ crassa. Fig. 50.

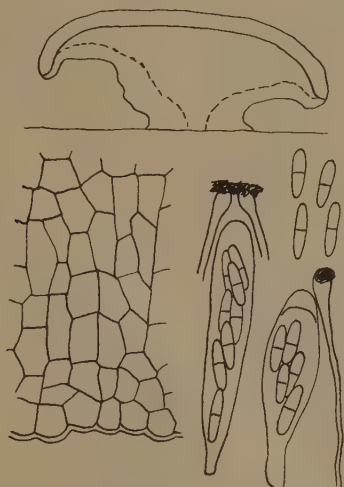


FIG. 50. *Karschia stygia* var. *tenuispora*. Diagrammatic section $\times 50$, details of excipulum and hymenium $\times 660$.

In hymenial characters this variety is almost intermediate between *K. stygia* and *K. lignyota* sensu Phillips and Rehm but structurally it resembles the former.

Leciographa *Massalongo*, *Geneacaena lichenum* 14 (1854).

Leciographa trinitatis *Dennis* spec. nov.

Ascomatibus gregariis, superficialibus, sessilibus, 2–3 mm. latis, nigris, glabris, excipulo crasso, nigro-brunneo, pseudoparenchymatico contexto; ascis clavatis, $150\text{--}161 \times 15\text{--}20\mu$, octosporis, J +; paraphysibus filiformibus, apice globulosis, 7μ cr., epithecium fuscum formantibus; sporis distichis, fuscis, 3-septatis, $38\text{--}47 \times 6.5\text{--}7\mu$.

Apothecia gregarious, superficial on decorticated wood. Disc 2–3 mm. broad, flat, dark purplish brown, black when dry; receptacle cupshaped with a broad base, smooth, soft. Flesh dark brown in water, reddish-purple in lactophenol, composed of tightly woven thinwalled hyphae $4\text{--}5\mu$ wide, with individual scattered inflated cells up to 15μ across; excipulum about 150μ thick, a pseudoparenchyma of very large thinwalled cells up to 40μ across, their long axes at right angles to the surface. Asci cylindric-clavate, apex broadly rounded with the wall thickened to about 7μ and there deeply stained blue in Melzer's reagent, 8-spored, $150\text{--}160 \times 15\text{--}20\mu$; ascospores biseriate, elliptic-fusiform, slightly curved, light yellowish-brown, mostly 3-septate with a large oil body in each cell, $38\text{--}47 \times 6.5\text{--}7\mu$, a few 1-septate, about $24 \times 6.5\mu$; paraphyses

slender, cylindrical, abruptly inflated to 7μ at the subglobose brown tip. Fig. 51.

Trinidad : outside mouth of cave, Cerro del Aripo, 23.X.1949, *Dennis* 234, Typus.

Structurally this is a *Karschia* with 3-septate spores.

Patellaria andina Speg. is a *Leciographa* with ascospores $20-25 \times 7-10\mu$.

Rhithopeziza balansae Speg., from south Brasil, has a similar structure, with brown 3-septate spores, $25-30 \times 8\mu$, and also belongs to the Lecanorales. It should be easily recognised by its bright orange disc on a black receptacle.

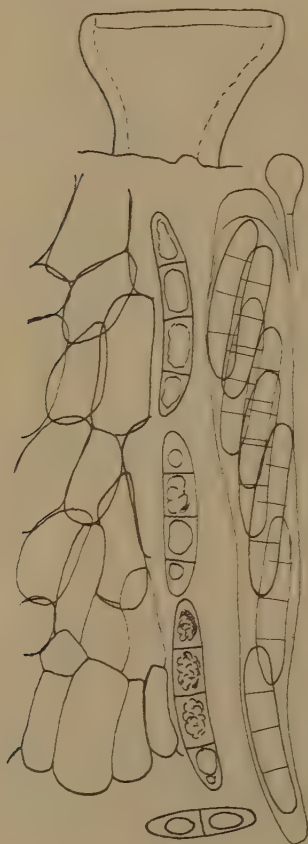


FIG. 51. *Leciographa trinitatis*. Diagrammatic section $\times 15$, excipular cells, spores and ascus $\times 660$.



FIG. 52. *Patellaria jamaicensis*, section of margin and spores $\times 660$.

***Patellaria* Fr., Syst. Myc. 2, 158 (1822).**

Patellaria is a somewhat anomalous genus, with bitunicate asci which suggest a possible relationship to the Pseudosphaeriales. Luttrell (1951), however, has left it in the Lecanorales and it is certainly here that an inexperienced person is likely to turn first in seeking the following species.

Key to the West Indian species :

- A. Ascospores 7-11-septate, $30-45 \times 7-10\mu$ *P. atrata*
- B. Ascospores 5-7-septate, $19-35 \times 4-8\mu$:
 - 1. Ascospores markedly clavate, $29-35 \times 7-8\mu$ *P. cyanea*
 - 2. Ascospores of almost uniform diameter, $19-31 \times 4-5\mu$ *P. jamaicensis*
- C. Ascospores 3-septate, $7-12 \times 3-3.5\mu$ *P. finkii*

***Patellaria jamaicensis* Dennis, spec. nov.**

Apotheciis in ligno decorticato gregarie sessilibus, atris, disco orbiculari, plano, 0.5 mm. diam. ; excipulo prosenchymatico contexto, crasso, fusco, glabro ; ascis clavatis, apice rotundatis, octosporis, $50 \times 14-16\mu$, J ope - ; sporis cylindraco-oblongis, utrinque obtusis, rectis v. subcurvatis, 5-septatis, haud constrictis, hyalinis, $21-25 \times 5\mu$; paraphysibus filiformibus versus apicem 5μ cr. et fuscis, interdum dichotomis, epithecium formantibus.

Apothecia gregarious, on decorticated wood, superficial with a basal peg penetrating the substrate, disc about 500μ diam., flat, black, with a slight rim when dry ; receptacle saucer-shaped, smooth, black. Excipulum of very slender hyphae which become parallel at a high angle to the surface and there broader, up to 4μ thick, short-celled, the surface layer completely black and opaque ; asci clavate, bitunicate, very short-stalked, $48-65 \times 14-16\mu$, thickened at the broadly rounded tip which is unstained in Melzer's reagent, 8-spored ; ascospores hyaline, elliptical, often slightly curved or slightly clavate, 5-septate, $19-31 \times 4-5\mu$, paraphyses slender, branched, terminal cells clavate, dark brown, 5μ wide, forming an epithecium. Fig. 52.

Jamaica, on *Sphaeropsis tumefaciens* gall on *Citrus aurantiifolia*, Martyn 202, July 1947.

Of the published species this seems nearest to *P. subatrata* P. Henn., said to have larger asci $80-90 \times 10\mu$ and to *Lecanidion neoguineense* P. Henn., described with narrower 7-septate ascospores. *Lecanidion andinum* Speg. differs mainly in its much longer asci, $95-111 \times 10-12\mu$. (Fig. 55 left).

***Patellaria cyanea* Cke. in J. Linn. Soc. Bot. 17, 142 (1878).**

Lecanidion cyaneum (Cke.) Sacc., Syll. Fung. 8, 801 (1889).

Apothecia gregarious, superficial, disc flat, black, about $\frac{1}{2}$ mm. diam. ; receptacle saucers shaped, smooth, black. Excipulum formed of slender, parallel, short-celled, brown hyphae, terminal cells inflated to 5μ but so cemented together by dark brown matter as to be opaque ; asci clavate, bitunicate, $85 \times 14\mu$, 8-spored ; ascospores irregularly biseriate, clavate, hyaline, 5-6-septate, $29-35 \times 7-8\mu$; paraphyses slender, hyaline, branched above, apical cells subglobose, 3μ diam., cemented by a brown substance into an epithecium, hymenial gelatine blueish in Melzer's reagent.

Collection seen : Texas, on a herbaceous stem, Houston, H. W. Ravenel 223, Typus. Fig. 53.

Seaver & Chardon (1926) recorded the species from *Citrus* twigs in Porto Rico.

Patellaria finkii Petrak in Ann. mycol. **21**, 309 (1923).

Apothecia clustered in small groups embedded among the fibres of decorticated wood, disc 250μ broad, flat, black; receptacle scutellate, black. Asci shortly clavate, $22-30 \times 10-15\mu$, bitunicate; ascospores irregularly arranged, clavate, 3-septate, $7-12 \times 3-3.5\mu$, hyaline to yellowish; paraphyses forming a brown epithecium, hymenial gelatine blueish in Melzer's reagent. Fig. 54.

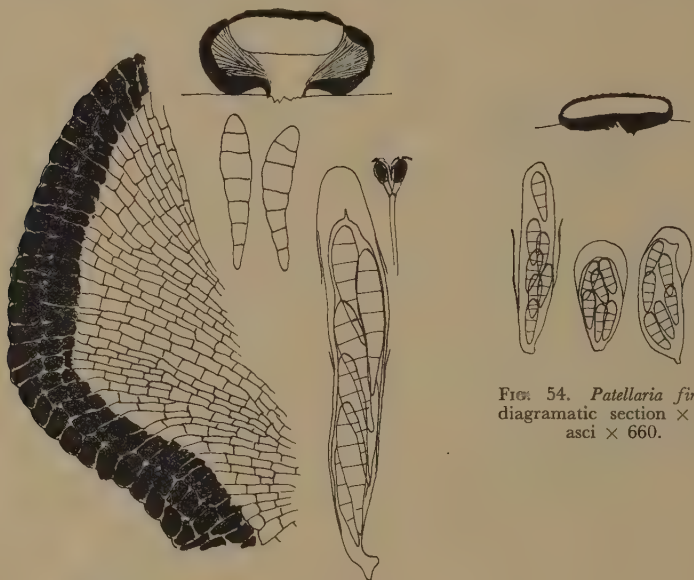


FIG. 54. *Patellaria finkii*,
diagrammatic section $\times 50$,
asci $\times 660$.

FIG. 53. *Patellaria cyanea*, diagrammatic section $\times 50$,
portion of excipulum, spores and ascus $\times 660$, from
Ravenel 223.

Collection seen: Porto Rico, on a post, Rio Piedras, 12.I.1915, *B. Fink* 505, Type number.

The type species of *Patellaria*, *P. atrata* Fr., a cosmopolitan species well described by Butler (1939), has been reported from St. Thomas (Seaver 1924), Porto Rico (Seaver & Chardon 1926) and Bermuda.

Lecanidion australe Speg., from La Plata, is probably a synonym of *P. atrata*. (Fig. 55 right).

The following is a doubtful member of the Helotiaceae which ought to be recollected and studied more fully.

Peziza hypophylla Berk. et Curt. in J. Linn. Soc. Bot. **10**, 369 (1868).

Pocillum hypophyllum (Berk. et Curt.) Sacc., Syll. Fung. **8**, 606 (1889).

Apothecia solitary, hypophyllous; disc flat, 2 mm. diam., reddish brown; receptacle saucer-shaped on a broad base, concolorous, smooth. Flesh composed of hyaline hyphae about 5μ thick, loosely woven except in the hypothecium or towards the surface and margin where they

become compact and parallel, the lumen reduced to a narrow canal in an apparently subgelatinised wall, except for the surface hyphae which are thinwalled and stain deeply in cotton blue. Asci cylindrical, rounded above, thickwalled, 8-spored, about $80 \times 8\mu$, pore not stained in Melzer's reagent or very faintly so; ascospores uniseriate, elliptical, hyaline, $7-10 \times 3.5-4\mu$, 1-guttulate; paraphyses very slender, 1μ thick, hyaline, repeatedly branched, not forming an epithecium. Fig. 56.

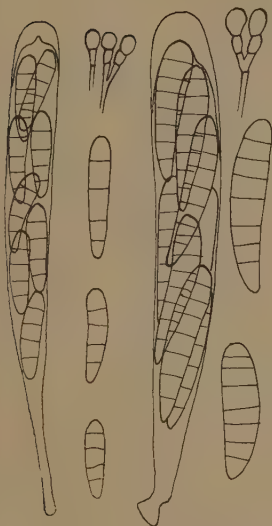


FIG. 55. Asci, paraphyses and spores of *Lecanidion andinum* (left) and *L. australe* (right), $\times 660$.

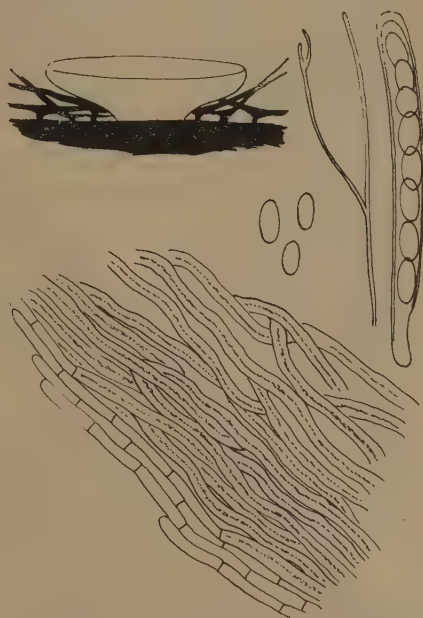


FIG. 56. *Peziza hypophylla*. Diagrammatic section $\times 15$, portion of excipulum, spores, paraphysis and ascus $\times 660$.

Cuba, Wright 762 (Typus), amongst T-shaped rust-coloured hairs on the underside of a leaf, Malpighiaceae according to Mr. N. Y. Sandwith.

Berkeley apparently confused loose paraphyses with ascospores when he described the latter as "sporidia filiformibus", hence Saccardo was quite misled in referring the species to *Pocillum*. The structure is somewhat phialeoid but the much branched slender paraphyses and tendency to gelatinisation of the hyphae may be held to point rather to the Lecanorales, though there is no hymenial colour reaction with iodine.

Patellaria pruinosa Karst., from Minas, Brasil, is a lichen; so is *Bactrospora integrispora* Seaver, from Porto Rico.

I am greatly indebted to the authorities of those foreign herbaria from which it has been possible to borrow type collections and especially to those at Paris, Helsinki, Stockholm, Eva Peron, New York and the Farlow Herbarium; also my colleagues Mr. N. Y. Sandwith and Dr. C. R. Metcalfe for their patience with the fragmentary and often ill-preserved host material brought them for determination.

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Encyclopedia of Floristry.*—Floral art and decoration have been made the subject of intensive study in recent years. This book, the first *Encyclopedia of Floristry* to be published in this country will therefore be welcomed both by the professional and amateur. It is written for the guidance of all florists and describes floral materials and the operations used in floristry to-day. The book is arranged alphabetically and deals with the tools of the florists' trade, methods of modelling, the wiring of individual flowers and bouquets, moss, foliage, care of flowers, pot plants, arrangement, etc. It is illustrated with photographs and line drawings showing details of the methods employed in floral make-up, and will be a valuable work of reference for all using flowers for decorative purposes.

H. S. MARSHALL.

* The *Encyclopedia of Floristry*. By Violet Stevenson. London : W. H. & L. Collingridge Ltd. New York : Transatlantic Arts Inc. Pp. 160. Illus. Price 21/-.

NOTES ON AFRICAN ASCLEPIADACEÆ.* IV.

A. A. BULLOCK.

The first part of this contribution arises mainly from a request by Dr. J. Léonard of Brussels for the correct name and distribution of *Tacazzea apiculata* var. *benedicta* Scott Elliott, which has involved an examination of all the available material of *Tacazzea* at Kew and at the British Museum.† The result has been a somewhat drastic reduction in the number of species and the recognition of two new genera based on characters other than those relied upon by N. E. Brown in his treatment of the family in the *Flora of Tropical Africa*. The resuscitation of *Schlechterella*, and the transference of *Tacazzea volubilis* to *Curroria* has also been found to be necessary.

The genera involved in this investigation and the characteristics by which they may be recognised are shown in the key below ; the species of *Raphionacme* and *Cryptolepis* will form the subjects of separate contributions to this series, and *Curroria* was dealt with in Kew Bull. 1953, 360–362.

Leaves with relatively few, arcuate, ascending lateral veins and no marginal vein ; follicles widely divaricate, stiffly coriaceous or membranous but not woody ; cymes corymbiform or flowers solitary or few :

Cymes or solitary flowers axillary ; axis monopodial :

Flowering shoots elongate ; erect or climbing shrubs with numerous flowers ; coronal lobes simple :

Coronal lobes clavate, subulate or filiform, relatively short and not intertwined over the stamens and stigma, glabrous *Cryptolepis*

Coronal lobes more or less elongate, filiform, usually intertwined over the stamens and stigma, or free from each other and then puberulous at least in the lower half *Tacazzea*

Flowering shoots short, with an apical cluster of leaves ; climbing shrubs with large tuberous rootstock ; flowers solitary or few :

Coronal lobes trifid *Schlechterella*

Coronal lobes simple ; follicles membranous *Curroria*

Cymes terminal or often laterally displaced, flowers numerous or few ; axis sympodial ; herbs with a tuberous rootstock *Raphionacme*

Leaves with very numerous straight, patent lateral veins connected by a distinct marginal vein ; cymes racemiform, axillary ; axis monopodial ; climbing shrubs :

Corolla lobes narrowly lanceolate, acutely acuminate, widely spreading in the open flower ; flower buds tapering to an acute apex ; pedicels short ; stems stout, fleshy, bark papery (South Africa) *Petopentia*

Corolla lobes oblong, obtuse, almost erect in the open flower ; flower buds broadly rounded at the apex ; pedicels very long and slender ; stems slender, bark fibrous (West Tropical Africa and northern Congo) *Zacateza*

Of these genera, *Raphionacme* is probably heterogeneous and may require to be divided into about three groups of generic status. Thus species like *R. splendens* Schltr. and *R. grandiflora* N. E. Br. have little in common with *R. brownii* Scott Elliott and *R. jurensis* N. E. Br., whilst these two groups differ considerably from *R. hirsuta* (E. Mey.) R. A. Dyer, the type of the generic name, and from such species as *R. globosa* K. Schum., *R. longifolia* N. E. Br. and *R. keayii* Bullock, which form a very distinct habit-group.

* Continued from Kew Bull. 1953, 362.

† Unless it is stated otherwise, the cited specimens are at Kew ; many of these are duplicated at the British Museum (Natural History).

Cryptolepis includes in Africa of a number of very closely allied species which need to be re-examined against the Asiatic material. Some of them were very ably dealt with by my colleague Miss E. A. Bruce in Kew Bull. 1946, 46-48, but it is possible that more new synonymy will be required.

I have found difficulty in writing convincing diagnostic descriptions of *Petopentia* and *Zacateza*. These genera are, however, quite distinct from each other both vegetatively and in flower structure. Some of the difficulty arises from the fact that both of the species concerned are incompletely known; I have seen no recently collected specimens of *Petopentia* but the rootstock is said to be a very large tuber and the follicles are apparently woody; the rootstock and follicles of *Zacateza* are unknown.

The two genera are not likely to be confused in the field; *Petopentia* does not occur further north or west than Natal, whilst I have seen no specimen of *Zacateza* from any area further south or east than Monbuttu-land. Both, apparently, are confined to humid forest.

The doubtful record of *Tacazzea natalensis* (*Petopentia natalensis* mihi) given by Robyns (1947) in his flora of the Albert National Park was apparently based on the identification of *Bequaert* 4494 with *Schlieben* 2939, which was wrongly named *Pentopetia natalensis* Schltr. and so distributed from Berlin.* This plant in fact represents an undescribed genus and is represented at Kew by several gatherings from rain forest in Tanganyika and the Belgian Congo. It is unique among African *Asclepiadaceae* in being an epiphyte with tuberous roots. Dr. P. J. Greenway found it in the crown of a *Piptadenia b Buchananii* tree near Amani. Its small reddish or yellowish flowers and remarkably long, slender follicles are to be found during November to January.

TACAZZEA Decne.

The genus *Tacazzea* was established by Decaisne (in DC. Prodr. 8, 492: 1844) for the single species *T. venosa* Decne., an erect, virgate shrub collected by *Schimper* (No. 636) in Ethiopia. The genus remained monotypic until 1875, when Oliver described an east African woody climber of fringing forests collected by *Speke and Grant*, as *T. apiculata* (Trans. Linn. Soc. 29, 108, t. 72).

Between 1875 and 1902, when N. E. Brown revised the genus for the *Flora of Tropical Africa*, several more species allied to *T. apiculata*, and two varieties of that species, were described.

In 1902 Brown also recognised that Decaisne's (*l.c.* 493) monotypic genus *Aechmolepis* (*A. rosmarinifolia*) was congeneric with *T. venosa* and at the same time he transferred to the genus *Schlechterella africana* (Schltr.) K. Schum. and *Raphionacme volubilis* Schltr. He also retained in *Tacazzea* another (discordant) element, *T. pedicellata* K. Schum. (1893), whilst in his enumeration of the family in the *Flora Capensis* he transferred to *Tacazzea* a further species, *Pentopetia natalensis* Schltr.

Between 1902 and present time, a few more species have been described but only one of these is here maintained. This is *T. tomentosa*

* I am grateful to Dr. W. Robyns, who kindly sent the relevant material on loan to Kew.
—A.A.B.

Bruce, which was described in 1936 from a specimen collected by *Eggeling* (No. 1704) in north-west Uganda and recently 1953 collected by *Gillett* (No. 15070) in equally dry country in southern Ethiopia. It is a scrambling shrub climbing over low, scrubby trees and has greenish-cream flowers. *T. viridis* A. Chev. ex Hutch. et J. M. Dalz. and *T. amplifolia* S. Moore should be referred to *Chlorocodon whitei* Hook. f.*

In the present treatment, *T. africana* (Schltr.) N. E. Br., *T. volubilis* (Schltr.) N. E. Br., *T. pedicellata* K. Schum., *T. viridis* A. Chev. ex Hutch. et J. M. Dalz. and *T. amplifolia* S. Moore are, as indicated above, excluded from *Tacazzea*; *T. venosa* Decne., *T. rosmarinifolia* (Decne.) N. E. Br., *T. salicina* Schltr. and *T. oleander* S. Moore are placed together as a single polymorphic species of disrupted distribution; *T. tomentosa* Bruce and a new species, *T. galactagoga* Bullock, are endemics of limited distribution, the former of the semi-arid country in northern Uganda and southern Ethiopia, the latter of mountain rain forest in Uganda, Kenya and Tanganyika. The remaining "species" are placed together under the name *T. apiculata* Oliv. which as thus understood is a plant of very wide distribution from Natal to Ethiopia, Angola and Senegal. It is an extremely variable species and though some of its constituents were originally described as erect, it is a woody climber of humid fringing forest which penetrates to some extent into the rain forest of the Congo basin.

As is shown below, each of the species occupies a particular ecological niche: so far as I have been able to judge, only *T. apiculata* is able to maintain itself in any variety of situations, and this is reflected in its great morphological variability.

KEY TO SPECIES.

- Leaves 3-4 or more times as long as broad, ascending; erect, virgate shrubs; calyx and corolla reddish outside, yellow inside; corona-lobes intertwined above the stigma 1. *T. venosa*
- Leaves up to twice as long as broad, very rarely a little longer than this, usually shorter, patent; climbing shrubs, but sometimes apparently suberect, with flexuous stems: Corona-lobes intertwined above the stigma, glabrous; corolla glabrous; leaves glabrous or more or less densely pubescent below, apex rounded or emarginate and apiculate, base rounded or cordate; flowers green inside, more or less red outside 3. *T. apiculata*
- Corona-lobes flexuous but not intertwined, puberulous, at least in the lower part: Corolla pubescent; flowers greenish cream or green; leaves ovate-lanceolate, densely tomentose on both sides, narrowed to a subacute apex, rounded at the base 2. *T. tomentosa*
- Corolla glabrous; flowers white, cream or reddish; leaves broadly elliptic, glabrous, apex abruptly acuminate to a well marked "drip-tip", abruptly cuneate at the base 4. *T. galactagoga*

1. ***Tacazzea venosa*** Decne. in DC. Prodr. **8**, 493 (1844); A. Rich. Tent. Fl. Abyss. **2**, 32 (1851); Engl. Hochgebirgfl. Trop. Afr. 341 (1892); K. Schum. in Engl. et Prantl. Naturl. Pflanzenfam. **4** (2), 216 (1895); N. E. Br. in Thiselton-Dyer. Fl. Trop. Afr. **4** (1), 264 (1902); Andrews. Fl. Pl. Anglo-Egypt. Sudan **2**, 418 (1952).—fl. 1 A-B.

* *Chlorocodon* Hook. f. 1871, non Fourr. 1869, nomen conservandum propositum, in Taxon, **3**, 67 (1954).—A.A.B.

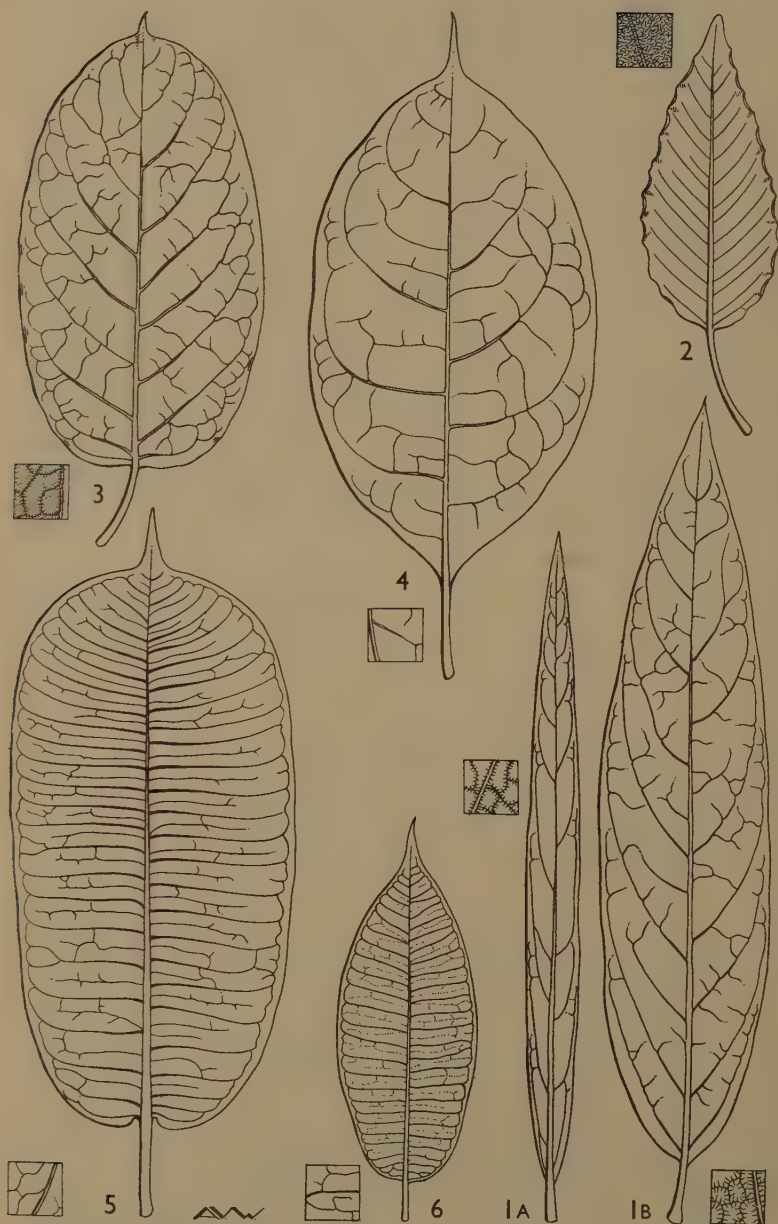


FIG. 1. A-B, *Tacazzea venosa* Decne. FIG. 2, *T. tomentosa* Bruce. FIG. 3, *T. apiculata* Oliv. FIG. 4, *T. galactagoga* Bullock. FIG. 5, *Petopentia natalensis* (Schltr.) Bullock. FIG. 6, *Zacateza pedicellata* (K. Schum.) Bullock.

Periploca venosa Hochst. in Herb. Schimp. ex Decne. *l.c.* in syn.

Aechmolepis rosmarinifolia Decne. *l.c.* ; K. Schum. *l.c.*

Tacazea martini Baill. in Bull. Soc. Linn. Paris, **2**, 808 (1889).

T. rosmarinifolia (Decne.) N. E. Br. *l.c.* 263, et *l.c.* 614 (1904).

T. venosa var. *martini* (Baill.) N. E. Br. *l.c.* 264 ; Andrews, *l.c.*

T. salicina Schltr. in Warb. Kunene-Sambesi Exped. 339 (1903) ; N. E. Br. *l.c.* 614, in syn.

T. oleander S. Moore in Journ. Bot. **50**, 338 (1912) ; Norman in Journ. Bot. **67**, Suppl. 2, 92 (1929).

This is a virgate shrub and its disrupted distribution recalls that of *Curroria decidua* Planch. ex Benth. (see Bullock in Kew Bull. **1953**, 360). It also calls for similar taxonomic treatment. Ecologically, as far as can be ascertained, it is to be found in the sand and rocks of river banks and has the narrow "salicine" leaves so often found in such situations.* A single character separates the Ethiopian material from the Angolan specimens and on this I propose to establish two subspecies :—

T. venosa subsp. **venosa**, calyce pedicellisque glaberrimis.

T. martini Baill.

T. venosa var. *martini* (Baill.) N. E. Br.

ETHIOPIA. Ad ripas fluvii Tacaze infra Dscheladscherane†, Nov. 1839 (fl., fr.), Schimper 636 (*typus speciei*). Asmotsch, Begemder, Nov. 1863 (fl., fr.), Schimper 1345. Walidabba, Waldubba Distr., June 1862 (fl.), Steudner 749. Lungo le riva del lagoa Gorgorá; March 1937 (fl.), Pichi-Sermolli 1240.

T. venosa subsp. **rosmarinifolia** (Decne.) Bullock, subsp. nov., calyce pedicellisque satis dense puberulis.

T. rosmarinifolia (Decne.) N. E. Br.

T. salicina Schltr.

T. oleander S. Moore.

ANGOLA. Caculivan River, between Cahama and Tchipelonga, close to water's edge ; "bush 8–12 ft., branches erect" ; May 1909 (fr.), Pearson 2553. Without locality or collector's name ; specimen in herb. Mus. Paris (fragment in herb. Kew.), the type of *Aechmolepis rosmarinifolia* Decne. Without locality ; Newton s.n. (comm. Sir. H. H. Johnston, Sept. 1883) (a fragment). Nambali, Cubango River, Amboella Distr., 1250 m., Oct. 1899 (fl.), Baum 245 (*typus*, *T. salicina*). Near Forte Princeza Amelia, banks of Cubango River ; Nov. 1905 (fl.), Gossweiler 2310 (*holotypus*, *T. oleander* S. Moore in herb. Mus. Brit., dupl. in herb. Kew.).

Gossweiler's notes, attached to his no. 2310 in the British Museum herbarium, are as follows :—"A shrub up to 6 ft. high resembling in its habit the *Nerium oleander* of Europe ; branched from the base, branches straight, ascending ; leaves soft, ascending, dusky green above and whitish-green beneath ; peduncles puberulous, flowers drooping ; calyx and corolla red-purple outside, corolla segments lurid yellow inside, like corona and stigma : along the banks of R. Cubango, frequently in company of *Salix*, growing in the fissures of granite rocks."

* See Van Steenis in Bull. Jard. Bot. Buitenzorg, Ser. 3, **12**, 174–175 (1932), and "Rheophytes" in Proc. Roy. Soc. Queensland, **62**, 61–68 (1952) ; also Sandwith in Journ. Arnold Arb. **24**, 225 (1943), sub *Ouratea cataractarum* Sandw.—A.A.B.

† As given on Schimper's label ; Richard gives Tchélatchékanné.—A.A.B.

2. **Tacazzea tomentosa** Bruce in Kew Bull. 1936, 477 (1936).—f. 2.

ETHIOPIA. Slopes north-west of Tula (5° 40' N., 38° 06' E.), 5200 ft., in *Acacia-Combretum-Commiphora* scrub; "climber, flowers green"; Feb. 1953 (fl.), Gillett 15070 (with flowers in spirit).

UGANDA. Agoro, Chua District; "a climber over small trees in savannah, flowers creamy to greenish"; March 1935 (fl.), Eggeling 1704 (*holotypus speciei* in herb. Kew.). (Agoro is a few miles south of the Sudan border, on the meridian 33° E.)

The striking floristic connection, across a broad strip of semi-arid lowland, between the southern highlands of Ethiopia and those of East Africa was discussed in some detail by my colleague Mr. J. B. Gillett at the second plenary meeting of the *Association pour l'Etude Taxonomique de la Flore d'Afrique Tropicale* ("A.E.T.F.A.T.") held at Oxford in October 1953.* *Tacazzea tomentosa* provides a further example of this connection. The species is still far from perfectly known either morphologically or geographically, but it is a woody climber over low trees of very dry savannah country, whereas *T. apiculata* is found in the less severe habitat of the humid fringing forest of savannah country and towards the limits of lowland rain forest areas.

The morphological features separating *T. tomentosa* from *T. apiculata* do not appear to be very convincing when written down; they are, nevertheless, quite real and there is no doubt that the two species are thoroughly distinct; they certainly occupy quite distinct habitats. Thus the corolla in *T. apiculata* is invariably glabrous whilst that of *T. tomentosa* is densely hairy outside; the corona-lobes of *T. apiculata* are always appreciably longer than the corolla segments whereas the reverse is the case in *T. tomentosa*. As its name implies, the vegetative parts of *T. tomentosa* are very densely hairy. The leaf indumentum is velvety-tomentose, equally dense on both surfaces and apparently constant; in *T. apiculata* the indumentum is always less dense, always quite thin on the upper surface of the leaves, and some specimens are completely glabrous, whilst (see ff. 2 and 3) the lateral veins are more numerous in *T. tomentosa* than in *T. apiculata*.

3. **Tacazzea apiculata** Oliv. in Trans. Linn. Soc. 29, 108 (1875); N. E. Br. in Thistelton-Dyer, Fl. Trop. Afr. 4 (1), 267 (1902); A. Chev. Études Fl. Afr. Centr. 1, 196 (1913); Chiov. in Miss. Biol. Borana, 4, Racc. Bot. 161 (1939); Brenan, Check List Trees Shrubs Tanganyika Terr. (2), 68 (1949); Tisserant, Cat. Fl. Oubangui-Chari, 24 (1950); Andrews, Fl. Pl. Anglo-Egypt. Sudan, 2, 418 (1952).—f. 3.

Leptopaetia sp. Harv. Gen. S. Afr. Pl. ed. 2, 231 (1868).

Tacazzea welwitschii Baill. in Bull. Soc. Linn. Paris, 2, 807 (1889); Schltr. in Journ. Bot. 34, 314 (1896); Hiern in Cat. Afr. Pl. Welw. 1, 678 (1898); N. E. Br. l.c. 264.

T. tholloni Baill. l.c.; N. E. Br. l.c. 266.

T. barteri Baill. l.c. 808; N. E. Br. l.c.; A. Chev. Expl. Bot. Afr. Occ. Franç. 1, 429 (1920); Hutch. et J. M. Dalz. Fl. W. Trop. Afr. 2, 52 (1931).

T. brazzaeana Baill. Hist. Pl. 10, 242, adnot. 2 (1890), nomen.

* See Brenan in Nature, 172, 987-989 (1953), where a brief summary of the proceedings is given. The papers are to be published in full in *Webbia* during 1954 under the editorship of Prof. Pichi-Sermolli, of Florence.—A.A.B.

T. verticillata K. Schum. in Engl. Bot. Jahrb. **17**, 114 (1893) ; N. E. Br. *l.c.* 265 ; Schltr. in Warb. Kunene-Sambesi-Exped. 339 (1903).

T. apiculata var. *glabra* K. Schum. *l.c.* 116, in adnot. ; N. E. Br. *l.c.* 267, in syn.

T. apiculata var. *benedicta* Scott Elliot in Journ. Linn. Soc. Bot. **30**, 91 (1894) ; N. E. Br. *l.c.* 267 ; A. Chev. Expl. Bot. Afr. Occ. Franç. **1**, 429 (1920) ; Hutch. et J. M. Dalz. *l.c.*

T. conferta N. E. Br. in Kew Bull. **1895**, 247 (1895) ; et in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 265 (1902) ; Brenan, *l.c.*

T. kirkii N. E. Br. in Kew Bull. **1895**, 248 (1895), et in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 265 (1902), et in Thiselton-Dyer, Fl. Cap. **4** (1), 540 (1907) ; Eyles in Trans. Roy. Soc. S. Afr. **5**, 446 (1916) ; Brenan, *l.c.* ; Codd, Trees Shrubs Kruger Nat. Park, 160 (1951), in obs.

T. nigritana N. E. Br. *ll.cc.* ; Hutch. et J. M. Dalz. *l.c.*

T. laxiflora Engl. Pflanzenw. Ost. Afr. **A**, 92 (1895), nomen.

T. floribunda K. Schum. in Engl. Bot. Jahrb. **30**, 381 (1901) ; N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 266 (1902) ; Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exped. 1907-8, **2**, 542 (1910) ; Schltr. in Notizbl. Bot. Gart. Berlin, **9**, 24 (1924) ; Robyns, Fl. Sperm. Parc Nat. Albert, **2**, 84 (1947).

T. stipularis N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 255 (1902), nomen subnudum superfluum, in obs.

T. bagshawei S. Moore in Journ. Bot. **44**, 88 (1906), et *l.c.* **45**, 50 (1907).

T. bagshawei var. *occidentalis* Norman in Journ. Bot. **67**, Suppl. 2, 92 (1929).

Widely distributed in tropical Africa, often abundant in damp riverine forest, especially towards the drier fringes of rain forest, from Natal northwards through eastern Africa including eastern Belgian Congo to Ethiopia, westwards through Southern and Northern Rhodesia to Angola and southern Belgian Congo, and through Uganda, Kenya, northern Belgian Congo and the Sudan westwards to Senegal.

My apparently drastic treatment of the specimens, to which hitherto no fewer than seventeen names have been applied, has been dictated by my failure to find any major character or combination of characters by means of which species may be separated with any certainty. Examination of the indumentum of the ovary, suggested by an apparent correlation between distribution and glabrous or hairy follicles gave no positive result and I have not thought it either necessary or desirable to establish named infra-specific taxa.

Table I shows the broad distribution of the "species" as described by their authors, enumerated by N. E. Brown (1902, 1907), indicated in the literature or taken from specimens at Kew and the Natural History Museum.

Table II is an analysis of the measurements given by Brown in the *Flora of Tropical Africa* (1902) or by S. Moore (1906).^{*} It is clear that there is no geographical or other correlation to be found in these figures. When the specimens concerned are examined it becomes clear that the figures reflect, in general, (a) the age of the specimen, (b) its position on the plant or (c) the habitat conditions of shade and moisture.

^{*} In the case of *T. tholloni* the measurements were not given by Brown, and have been taken from *Brazza* 507 in the Kew herbarium.—A.A.B.

Table I. The distribution of the climbing "species" of *Tacazzea* now referred to *T. apiculata*.

	Upper Guinea	N. Congo, Cameroons	Sudan	Abyssinia, Eritrea, Somaliland	Uganda	Kenya	Tanganyika	N. & S. Rhodesia, Bechuanaland	S. Congo, Katanga	Angola	Mozambique	Transvaal	Natal
<i>T. kirkii</i>					?	?	*	*	*	■	!*	*	!*
<i>T. welwitschii</i>										!			
<i>T. verticillata</i>										!	*		
<i>T. bagshawei</i> var. <i>occidentalis</i> †...									*				
<i>T. laxiflora</i> †‡							*						
<i>T. floribunda</i>		*		!	*	*	*						
<i>T. apiculata</i>	*	*	!*	!*	!*		!						
<i>T. conferta</i> / ...				!	*		?*						
<i>T. bagshawei</i> †					*								
<i>T. apiculata</i> var. <i>benedicta</i> ...	!*	*											
<i>T. thollonii</i> †		!											
<i>T. brazzaeana</i> †‡													
<i>T. barteri</i>	!*												
<i>T. nigriflora</i>	!*												

† Species not seen by N. E. Brown.

‡ indicates *nomina nuda*.

! specimens cited by N. E. Brown.

* Records other than by N. E. Brown.

Table II. Size of various organs of the climbing "species" of *Tacazzea* now referred to *T. apiculata* Oliv. The last column shows the number of specimens from which the measurements were obtained.

	Petiole (Length) cm.	Lamina cm.	Panicle (Length) cm.	Bracts (Length) mm.	Pedicels mm.	Calyx-lobes (Length) mm.	Corolla-lobes (Length) mm.	Corona-lobes (Length) mm.	No. of specimens
<i>T. kirkii</i>	1.2-3.8	5-12.5 × 2.5-5.5	5-10	2-3	3-8	2	5	8	4
<i>T. welwitschii</i>	0.65-1.8	4.5-9 × 2.5-5	5-10	3	6-15	2	6	7	3
<i>T. verticillata</i>	0.5-0.8	2.5-6.5 × 1.3-2.8	7.5-11.5	1-2	6-13	2	5-6	6-7	1
<i>T. laxiflora</i>	?	?	?	?	?	?	?	?	1
<i>T. floribunda</i>	2-4.5	10-15 × 6.5-10	12.5-18	1.5-2.5	4-8	2	4-5	5-6	2
<i>T. apiculata</i>	1.2-3.8	5-12.5 × 2.5-9	6.5-15	1-2	6-18	1.5	6	10	11
<i>T. conferta</i>	1-2	6-10 × 2.5-4.5	≈10	1.5-2	4-6	1.5-2	4-5	4.5-5	1
<i>T. bagshawei</i>	1-2 (-2.5)	7-8 × 4.5-6.5	6	1.5	5	1	7.5	8-8.5	1
<i>T. thollonii</i>	≈2.5	7-11 × 4.5-7.5	12	1.5	5-10	1.5	4-5	7	1
<i>T. brazzaeana</i>	?	?	?	?	?	?	?	?	1
<i>T. barteri</i>	0.8-1.3	3.8-7.5 × 1.7-3.8	2.5-6.5	2	4-6	2	6-7	8	1
<i>T. nigritana</i>	2	6.5-7.5 × 2-2.6	5	1-2	4-7	1	4-5	6	1

The origin of the alleged erect habit of such "species" as *T. welwitschii* and *T. verticillata* is simply that they were represented by specimens taken from plants growing afresh after having been "pruned" by fire, or some other means, to ground level. Other characters used by Brown in his key to the species break down when examined more carefully against the background of more and better material and more enlightening collectors' notes. Thus *T. conferta*, *T. barteri* and *T. thollonii* are said to have

glabrous leaves and are further separated by small differences in the leaf shape, and by a difference in size of the inflorescence. The remaining species have leaves "puberulous, pubescent or tomentose beneath", but I have been unable to detect any real difference between these states of hairiness by reference either to the material at Brown's disposal or to the more adequate material now available, which indicates that the presence, greater or less density, or absence of indumentum on leaves, stems, and inflorescence is probably only due to habitat variation. *T. nigritana* and *T. apiculata* are separated by "Calyx quite glabrous" contrasted with "Calyx more or less puberulous hairy or tomentose", but here again the mere presence or absence of hairs on the calyx does not seem to be a character of specific importance. The final characters used by Brown refer to the greater or less development of the "stipulary line" between the leaf bases and the density of the inflorescence. The former I have been unable to observe adequately but it seems likely that when present the "stout reflexed and erect teeth" attributed to *T. floribunda* may be only an expression of vigour. It is not constant even on the specimens cited by Brown. Similarly the "Panicles very lax, . . ." of *T. verticillate*, as against "Panicles pyramidal . . ." is almost certainly a difference induced by habitat and may also indicate to some extent the relative ages of the specimens examined, or whether the specimen came from a small lateral, or an extreme terminal shoot of a large plant.

Baillon (1890), referred to his *T. brazzaeana* as a source of rubber and several collectors draw attention to the very copious first flow of latex which, however, soon stops.

4. **Tacazzea galactagoga** *Bullock*, sp. nov. inter species congeneras coronae lobis inter se liberis inferne dense puberulis superne leviter incrassatis distincta.—f. 4.

Frutex alte scandens, glaber; rami tenues. *Folia* membranacea, petiolata, petiolis 2–2.5 cm. longis, elliptica, plus minusve 15 cm. longa et 8 cm. lata, apice abrupte acuminata (acumen acutum, 1.5 cm. longum), basi acuta, nervis lateralibus primariis alternantibus utrinque 4 arcuatis. *Cymae* diffusae, trichotome ramosae, pedunculis et ramis primariis 2.5–4 cm. vel ultra longis, floribus apice ramorum breviorum pedicellatis satis congestis, pedicellis 3–7 mm. longis; bractae minutae. *Calyx* fere ad basin 5-lobatus, lobis triangulari-ovatis apice obtusis circiter 1 mm. longis. *Corolla* rotata, tubo brevissimo, lobis oblongis patentibus apice obtusis 4 mm. longis et 1.75 mm. latis. *Coronae lobi* elongati, liberi, 5–6 mm. longi, dimidio inferiore pilis brevissimis satis dense puberuli, superne flexuosi, leviter incrassati, glabri, e basi filamentorum incrassatorum orti. *Folliculi* erecti, coriacei, glabri, 12–13 cm. vel ultra longi, circiter 12 mm. diametro, apice obtusi.

TANGANYIKA TERRITORY. Tanana, Uluguru Mts., 4500 ft., frequent in forest; "liane, reddish flowers"; Feb. (fl.), *E. M. Bruce* 757 (holotypus in herb. Kew.).

KENYA COLONY. Chyulus, over 5200 ft., common in rain forest; "a strong climber with whitish-yellow flowers in panicles; root strongly vanilla-scented"; May, 1938 (fl., fr.), *Bally* 7924.

UGANDA. Ruwenzori, 7000 ft.; (sterile), *Dawe* 666.

Unlike its congeners, *T. galactagoga* occurs in the much more equable climate of the equatorial mountain rain forest and constitutes a fourth

habitat-group in the genus. It differs conspicuously from both *T. apiculata* and *T. tomentosa* in its very thin leaves with well developed "drip-tips" and in its coronal lobes, which are merely flexuous in the upper half, not intertwined, and densely puberulous in the lower half. Miss E. M. Bruce remarked that it is "frequent", Mr. P. R. O. Bally that it is "common", and it is remarkable that only one other collector has taken specimens. Mr. Bally also remarked that the root, which is strongly vanilla-scented, is much sought by natives as a galactagogue for both humans and cattle.

CURRORIA Planch. ex Benth.

I re-established this genus (Kew Bull. 1953, 360), with two species, and now consider that a third should be added to it.

Curroria volubilis (Schltr.) Bullock, comb. nov.

Raphionacme volubilis Schltr. in Journ. Bot. 33, 302 (1895).

Tacazzea volubilis (Schltr.) N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. 4 (1) 262 (1902).

TANGANYIKA TERRITORY. Mkomazi, 2000 ft., on slopes of desert hills clothed with *Sansevieria* and *Commiphora*; "climbing to 8 ft., milky latex"; Nov. 1935 (fl.), Burt 5325. Buiko, Lushota Distr., 510 m., in dry *Acacia-Commiphora* community; "woody climber, climbing by twining; corolla yellow-green, coronal lobes yellow with filiform appendages"; April 1953 (fl., fr.), Drummond and Hemsley 2307 (with material in spirit). Nyambiti, Massanza Is., Muranza, Lake Prov., 3000 ft., on hillside among rocks; "creeper on ground or over shrubs, with several stems from a large tuber, flowers white, aromatic, sap milklike"; March 1953 (fl.), Tanner 1274.

KENYA COLONY. Moyale, Northern Province, 3° 32' N., 39° 03' E., 2600 ft., at the foot of the scarp in *Commiphora-Acacia* scrub, frequent; "twiner, corolla yellowish-green"; Oct. 1952 (fl.), Nov. 1952 (young fr.), Gillett 14068. Without locality or date; (Ruwenzori Expedition, 1893-4), Scott-Elliott s.n. (type collection).

Schlechter referred this species to *Raphionacme* Harv., presumably on account of its filiform corona lobes; Brown transferred it to *Tacazzea*, stating that its structure and habit "is entirely that of a *Tacazzea*".

Both authors depended entirely on flower structure, particularly the form of the corona, for in his assessment of the habit character Brown was certainly mistaken, there being no other *Tacazzea* with short flowering spurs except *T. africana* (Schltr.) N. E. Br. which I have (see p. 360) returned to *Schlechterella*.

The short shoot character, on which I have largely depended for the resuscitation of *Curroria* Planch. ex Benth. (see Kew Bull. 1953, 360), I regard as extremely important, far outweighing the relatively small differences in the corona described by Brown and almost invariably used by him for the delimitation of genera.

Although *Curroria* was part of *Cryptolepis* R. Br. as understood by N. E. Brown, the latter did not specially mention *Cryptolepis* in his statements concerning the delimitation of *Tacazzea* and *Raphionacme*, though the very clear similarity of *Curroria decidua* and *Raphionacme volubilis* should have made this necessary.

SCHLECHTERELLA K. Schum.

This genus was originally described by Schlechter (1895) under the name *Pleurostelma*, he having overlooked *Pleurostelma* Baill. (1890) which

antedated it. The genus is amply distinct from *Tacazzea* Decne., with which Brown (1902) united it, by reason of its habit, leaf-form and trifid coronal lobes.

The rootstock of the type species is a large tuber and is eaten by natives in time of drought, and also is fed to young camels (*vide* Gillett) ; although the rootstock of *Tacazzea* is not known except in the case of *T. galactagoga* Bullock, the plants are large woody forest climbers or virgate shrubs and it is unlikely that the rootstock of the other three species even if tuberous, can be anything but woody. Although a few cymes are produced in the axils of leaves on long shoots, *Schlechterella* normally produces short flowering spurs bearing two to four leaves from the axils of which small cymes arise ; *Tacazzea* may have cymes from the axils of leaves along the stems but the majority are produced in the terminal regions, giving the appearance of a large inflorescence, and never on short flowering spurs. The coronal lobes of *Tacazzea* are simple filiform appendages, whereas those of *Schlechterella* are trifid and somewhat curiously formed. N. E. Brown described them as follows :—
“ filiform, trifid, erect in the lower half, then abruptly bent inwards and divided into three at the bend, lateral division shortest (sic), erect, middle one bent down and then upwards, all filiform, tortuous and intermingled over the top of the stamens and style ; the entire lobe 1.5–1.75 lines long, the undivided part rather more than 0.5 line long”. The simple filiform coronal lobes of *Tacazzea* are up to 10 lines long.

The type material was collected by *Scott-Elliott* (No. 6175) and Brown deduced from the number that the locality was between Maungu Mountain and Mbuyani, in the Taita District ; in addition to a specimen of this collection, several others, listed below, are now incorporated in the Kew herbarium from Tanganyika and Kenya, the inference being that the plant is probably comparatively frequent throughout the dry areas in northern Tanganyika and eastern Kenya.

Schlechterella africana (Schltr.) K. Schum. in Engl. et Prantl, *Naturl. Pflanzenfam. Register*, 462 (1899), et *l.c.* Nachtr. zum 2-4, 60 (1900) ; typus nominis generici.

Pleurostelma africanum Schltr. in *Journ. Bot.* **33**, 303, t. 351 (1895).

Tacazzea africana (Schltr.) N. E. Br. in *Thiselton-Dyer*, *Fl. Trop. Afr.* **4** (1), 261 (1902).

TANGANYIKA TERRITORY. Kisangiro, Upare District, about 2500 ft. ; “ creeper ” ; Oct. 1927 (fl.), *Haarer* 913.

KENYA COLONY. Between Maungu Mt. and Mbuyuni, Taita District (*vide* N. E. Brown, *l.c.*), in red sand : “ a climber with white flowers ” ; *Scott-Elliott* 6175. Northern Frontier Province : Dandu, 3° 26' N., 39° 54' E., with mountain rising to 1100 m. ; “ twiner, leaves dark green with lighter veins ; tuber 15 cm. below surface, juice milky, corolla cream ” ; April, 1952 (fl.), *Gillett* 12710. Lagola, 45 km. west of Ramu on the Banessa road, 3° 35' N., 40° 54' E., about 450 m., on white limestone slopes with shallow pale soil, in *Commiphora-Acacia* open scrub ; “ corolla purple ” ; May 1952 (fl.), *Gillett* 13280 ; *ibid.* ; “ twiner, corolla yellowish-green ” ; June, 1952 (fl.), *Gillett* 13411. 24 km. north-east of Damassa, 3° 21' N., 41° 24' E., 420 m., in rich *Commiphora-Acacia* scrub on deep red sandy soil with sandstone outcrops ; “ twiner ” ; May, 1952 (fl.), *Gillett* 13324.

Mr. J. B. Gillett has obtained the vernacular names FAJITA, ELI (Somali) ; SINGO (Boran), and the following habitat notes for his Dandu specimen :—“ Rainfall perhaps between 300 and 400 mm. with

maxima in April and probably November. In 1952 the main rains started on 27th March. Rock red granite ; soils :—(a) a red sandy loam on well drained slopes, (b) pale sandy soil near watercourses, (c) a yellowish brown powdery soil on flats, (d) ' black cotton soil ', glutinous, cracking, in areas of impeded drainage. A rich *Commiphora-Acacia* scrub with scattered larger trees such as *Delonix*, *Terminalia*, *Gyrocarpus*."

ZACATEZA *Bullock*

Zacateza *Bullock*, gen. nov. hactenus cum *Tacazzea* Decne. confusum, sed venis lateralibus foliorum numerosis parallelis patentibus inter se vena marginali connexis, pedicellis tenuibus elongatis ebracteolatis distinctum.

Calyx fere ad basin 5-partitus, segmentis late ovato-triangularibus. *Corolla* fere ad basin 5-partita, tubo obsoleto-annulari ; lobi oblongi, obtusi, alabastro dextro-contorti, sub anthesi suberecti, haud patentés. *Coronae lobi* simplices, inter se liberi, e basi filamentorum orti, erecti, filiformes, superne flexuosi, glabri ; lobuli intermedii filamentis plus minusve aequilongi. *Filamenta staminum* libera, filiformia ; antherae magnae, circa discum stigmaticum adpressae, apiculis supra stigma conniventibus.—*Frutices* monopodiales, scandentes ; folia venis lateralibus numerosis parallelis patentibus inter se vena marginali connexis praedita ; cymae racemiformes, rachide bracteata, pedicellis elongatis ebracteolatis.—Fig. 6.

Species hactenus nobis cognita 1, Africae tropicae incola.

Zacateza pedicellata (*K. Schum.*) *Bullock*, comb. nov., typus nominis generici.

Tacazzea pedicellata K. Schum. in Engl. Bot. Jahrb. **17**, 115 (1893) ; N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 262 (1902) ; Mildbr. Wiss. Ergebn. Zweit. Deutsch. Zentr.-Afr.-Exped. 1910–11, **2**, 89 (1922).

T. pedicellata var. *occidentalis* N. E. Br. *l.c.* 263.

The specimens cited by K. Schumann were collected by *Schweinfurth* (Nos. 3483 and 3488) and these numbers are represented at Kew by a single sheet bearing two flowering branches. The total representation of the species at Kew is as follows :—

SOUTHERN NIGERIA. Lagos ; " woody twiner, flowers white or cream " ; *Dalziel* 1348. Igbessa ; " creeper with white flowers " ; Jan. 1893 (fl.), *Millen* 130.

BELGIAN CONGO. Munsa, Monbuttu-land ; April 1870 (fl.), *Schweinfurth* 3483, 3488 (including the type of the species, though the holotype was lost from Berlin). Yangambi ; July 1938 (fl., young fr.), *Louis* 10524. R. Momboyo, Bokuma ; Sept. 1935 (fl.), *Louis* 106.

Mildbraed (*l.c.*) also recorded the species from Minjem in the Ebolowa-Sangmelima district, but I have not seen his specimen.

Fig. 6 shows a rather small leaf of this species ; in general the leaves are larger (8–10 cm. long, 3–3.5 cm. broad) and they tend to be rather more oblong, or occasionally the widest part is above the middle. The Yangambi specimen indicates that the mature folicles are reflexed ; the fruiting pedicel becomes greatly thickened throughout its length, as does the relatively short rhachis of the infructescence.

PETOPENTIA Bullock

Petopentia Bullock, gen. nov., cum *Zacateza* Bullock hactenus *Taczazea* Decne. vel *Pentopetia* Decne. confusum, ut in *Zacatezae* venis lateralibus foliorum numerosis parallelis patentibus inter se veno marginali connexis, sed pedicellis brevibus bibracteolatis superne incrassatis, corollae lobis sub anthesi late patentibus ab omnibus distinctum.

Calyx fere ad basin 5-partitus, segmentis ovatis acutis. *Corolla* rotata, tubo obsoleto annulari, lobi anguste lanceolati, acuti, alabastro gradatim acuminato, dextro-contorti, sub anthesi late patentes. *Coronae lobi* simplices, filiformes, superne flexuosi; lobuli intermedii nulli. *Filamenta staminum* filiformia, libera; antherae circa discum stigmaticum adpressae et supra stigma conniventes. *Frutices* ut videtur sympodiales, alte scandentes, caulibus e tubero radicali magno ortis; cymae laterales, racemiformes, rachide bracteato, pedicellis bibracteolatis brevibus superne leviter incrassatis; folliculi late divaricati, lignosi, lanceolato-fusiformes.—Fig. 5.

Species 1, Africae australis incola.

Petopentia natalensis (Schltr.) Bullock, comb. nov., typus nominis generici.

Pentopetia natalensis Schltr. in Journ. Bot. **32**, 257 (1894), et *l.c.* **34**, 315 (1896).

Taczazea natalensis (Schltr.) N. E. Br. in Thiselton-Dyer, Fl. Cap. **4** (1), 541 (1907).*

NATAL. "... plant with large tuberous roots, just appearing above the ground, brought ... from forest near Umbogotwimo River, Umlagi native location and flowered ['greenish yellow'] in Botanic Garden [Durban]; July 1886, Wood 3634 (*isotypus* in herb. Kew.). Without locality or date; (fr.), Gerrard 780.

CAPE PROVINCE. Transkei, near Kentani, 1000 ft., occasional in forests; "twining to great heights, root 2 ft. diam."; Nov. 1904 (fr.), Pegler 916.

Seeds from Gerrard's specimen, received at Kew in July, 1865, were germinated and produced a flowering plant of which a small piece was preserved,—but without any additional observations.

MISCELLANEOUS NOTES AND RECORDS.

CYNANCHUM Linn.

Cynanchum is a large genus found in warm regions of both hemispheres and it exhibits a great range of habit. I have already (Kew Bull. **1953**, 354–357: 1953) drawn attention to extensions of the known range of several species and below are further similar notes. The extension of the range of *C. praecox* to Sierra Leone is in part a vindication of my earlier note (*l.c.* p. 355, f. 6), whilst the addition of *Periploca batesii* Wernham to the synonymy of *C. polyanthum* reveals one of the amazing errors that most taxonomists make from time to time.

Cynanchum praecox Schltr. ex S. Moore; Bullock in Kew Bull. **1953**, 354 (1953).

* The record of this species from the Belgian Congo is based on a misidentification. See p. 350.—A.A.B.

A further specimen of this strange species, extending its distribution far to the west, has been received at Kew. The specimen, however, adds nothing to our meagre knowledge of the morphology of the plant.

SIERRA LEONE. Loma Mts., savannah, about 1600 m. ; Jan. 1952 (fl.), *Jaeger*, 4168.

Cynanchum polyanthum K. Schum. in Engl. et Prantl, *Naturl. Pflanzenfam.* **4** (2), 253 (1895) ; N. E. Br. in Thiselton-Dyer, *Fl. Trop. Afr.* **4** (1), 393 (1903) ; Robyns, *Fl. Spermi. Parc Nat. Albert*, **2**, 95 (1947).

Vincetoxicum polyanthum K. Schum. in Engl. Bot. Jahrb. **17**, 136 (1893), non O. Ktze. (1891), nom. illegit. ; Durand et Schinz, *Études Fl. Congo*, **1**, 194 (1896).

Cynanchum welwitschii Schltr. et Rendle in *Journ. Bot.* **34**, 99 (1896).

C. obscurum K. Schum. in Engl. et Prantl, *Naturl. Pflanzenfam.* **4** (2), 253 (1895) ; Hiern in *Cat. Afr. Pl. Welw.* **1**, 688 (1898).

Periploca batesii Wernham in *Journ. Bot.* **54**, 228 (1916).

[*Cynanchum mossambicense* (non K. Schum., 1895) ;—Schltr. in *Journ. Bot.* **33**, 337 (1895).]

FRENCH CAMEROONS. Yaunde ; *Zenker* 223. Bitye, Yaunde ; *Bates* 947, 1026, 1220, 1648 (omn. BM).

BELGIAN CONGO. Monbuttu-land, Munsa ; March (fl.), *Schweinfurth* 3345 (*typus*). Rutshuru ; 1937 ; *Ghesquière* 3918. Yangambi ; May 1938 (fl., fr.), *Louis* 9479.

SUDAN. Yei River, Lado ; (fl.), *Sillitoe* 455.

UGANDA. Bukasa Forest, Kiagwe, 3800 ft. ; " slender climber with yellow and green flowers " ; April 1932 (fl.), *Eggeling* 667. Mutengo, at edge of Lake Victoria, a few miles from Kampala, among Papyrus vegetation near water edge ; " flowers whitish, flushed with a shade of pale purple " ; Dec. 1935 (fl.), *Chandler* 1496. Kawanda, near Kampala ; Dec. 1935 (fl.), *Chandler* 1517. Luzira Forest, near Kampala ; May 1929 (fl.), *Liebenberg* 826. Usoga ; Dec. 1898 (fl.), *Whyte* s.n. Masaka-Bukakata road, 4 miles from Masaka, 1150 m. ; Oct. 1953 (fl.), *Drummond and Hemsley* 4736.

ANGOLA. Galungo Alto ; *Welwitsch* 4200. Musengue, Galungo Alto ; " herba glauco-viridis, volubilis, late scandens, lactiflua, foliis carnosulis mox flaccidis supra laete viridibus subtus pallidis, florum petalis sordide violaceis, follicula solitaria conico-pyramidata trigona angulo obtusissimo " ; Nov. 1855 (fl., fr.), *Welwitsch* 4222 ; *ibid.*, Aug. 1856 (fr.), *Welwitsch* 4253 (BM). Camondai, Cazengo ; Nov. 1914 (fl.), *Gossweiler* 6333 (BM). Cazengo ; 1911 (fl., fr.), *Gossweiler* 4866. Calanga, common here and there in thicket-grown woods skirting open [country] ; " herbaceous climber with persistent rootstock, stems cord-like, erectly twining on neighbouring climbers, leaves soft, flaccid, dusky green above and pallid beneath, flowers purplish-green outside, [young] fruits green, the whole plant very milky " ; Nov. 1907 (fl., young fr.), *Gossweiler* 1648 (BM).

Wernham (1916) stated that his species is " allied to *P. nigrescens* Afzel." and this is certainly true in that both plants are referred to the *Asclepiadaceae* ; they belong, however, to different tribes and apart from the climbing habit have no resemblance to each other.

Vincetoxicum polyanthum O. Ktze. *Rev. Gen.* (2), 424 (1891), was a new name for *Tylophora floribunda* Benth. (not *Cynanchum floribundum* R. Br. or *Vincetoxicum floribundum* Franch. et Sav. ; it was validly published and therefore renders *V. polyanthum* K. Schum. (1893) a later homonym which must be rejected under Art. 74 of the International Code of Botanical Nomenclature (1952). This does not, however, preclude the use of the epithet *polyanthum* on transference of the species to *Cynanchum* (see Art. 81), where it must be regarded as part of a new name.

Cynanchum defoliascens K. Schum. in *Ann. Istit. Bot. Roma*, **7**, 38 (1898) ; N. E. Br. in Thiselton-Dyer, *Fl. Trop. Afr.* **4** (1), 400 (1903), sub

species imperfectae connatae ; Hutch. et Bruce in Kew Bull. **1941**, 145 (1941).

SOMALIA. In planitiibus aridis prope Mandah ; *Robecchi-Bricchetti* 100 (*holotypus* in herb. Rom.). (Mandah is at approximately 10° 59' N., 43° 20' E.).

BRITISH SOMALILAND. Boundary Pillar 93, 8° 37' N., 45° 09' E., 3300 ft. ; "weak ascending shrub, flowers greenish" ; Oct. 1932 (fl.), *Gillett* 4187. Common along the Abdalcader-Zeilah road, except in salt flats ; Jan. 1945 (sterile), *Glover and Gilliland* 525. Habera, 4000-5000 ft., in stony plains ; "small shrub 12-18 ins. grazed by goats" ; Oct. 1938 (fl.), *McKinnon* 8/113. Kodoyareh, 4 miles south of Dar Bruck ; "erect shrublet, flowers yellowish" ; May 1949 (fl.), *Bally* 7181. Locally common on the Senag plains ; "erect shrub 3 ft. high" ; May 1949 (fl.), *Bally* 7236.

KENYA COLONY. Eastern shore of Lake Rudolf ; 1899 (fl.), *Wellby* s.n. Yabichu, near Ramu, Northern Province, 3° 56' N., 41° 12' E., about 360 m., in *Commiphora-Acacia* open scrub on pale limestone soils ; "corolla yellow" ; May 1952 (fl.), *Gillett* 13296.

This is unlike any other species of *Cynanchum* known to me and it may well be that Brown (1903) was correct in his suggestion that it should be referred to another genus. The development of serial buds produces clusters of branchlets at the nodes of the main stems and this effect could be produced by the severe grazing and browsing to which the plant is subjected.

The first identification of this plant at Kew was by Dr. Hutchinson and Miss Bruce, who compared Mr. J. B. Gillett's Somaliland collection with the holotype. Dr. Wellby's specimen has lain among the *incertae sedis* of the family for over fifty years and my attention was drawn to it during my effort to name Mr. Gillett's more recent specimen from Kenya. This led to the identification of the remaining recent collections.

Mr. Bally gives the vernacular name *Nyuri* and states that the plant is used medicinally.

MARSDENIA *R. Br.*

The unity of the floras of northern Kenya, southern Ethiopia, Somalia and British Somaliland is being constantly demonstrated by the discovery in Kenya of plants formerly believed to occur only in Ethiopia or Somalia or British Somaliland. I have recorded (*supra*, p. 363) *Cynanchum defoliascens* K. Schum. as one such species, and *Marsdenia stelostigma* K. Schum. (*infra*) is another.

The other three species of *Marsdenia* listed below demonstrate the essential floristic unity of the African rain forests which have their centre in the Congo basin and extend into Uganda and Kenya, westwards to Senegal and into Angola.

Marsdenia stelostigma K. Schum. in Engl. Bot. Jahrb. **33**, 330 (1903) ; N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 619 (1904).

Stigmatorhynchus stelostigma (K. Schum.) Schltr. in Engl. Bot. Jahrb. **51**, 141 (1913), in obs.

Marsdenia stefaninii Chiov. Res. Sc. Miss. Stefan.-Paoli Somal. Ital. **1**, 116 (1916), et Fl. Somalia, 221 (1929).

Schuman (1903) recorded this species from Tarro Gumbi, Boran, Ethiopia*, where it was collected in flower by *Ellenbeck* (No. 2080) in

* Schumann referred this locality to Somaliland but it is now in Ethiopian territory at about 41° 28' E., 4° 58' N.—See Erlanger *et al.* in Zeitschr. Gesell. Erdkunde, 1904, 86, 118, maps 2-5. I am indebted to my colleague Mr. J. B. Gillett for this information and the important reference to the maps showing *Ellenbeck's* route.—A.A.B.

April, 1901. It was no doubt transferred to his new genus *Stigmatorhynchus* by Schlechter (1913) on account of its condensed inflorescence, for the diagnostic feature "*folliculus monospermus*" was not observable by him and his dissection of the flowers should have shown that the carpels are multiovulate, not uniovulate or biovulate as in *Stigmatorhynchus hereroensis* Schltr. and *S. umbelliferus* (K. Schum.) Schltr. (*infra*, p. 373).

Chiovenda's species was first collected by *Stefanini* (No. 1216) at Ischia Baidoa and he again recorded it (1929) from near Migiurtini.

The plant has now been collected in Kenya by Mr. P. R. O. Bally ; his specimen has been identified *ex descriptione* with both *M. stelostigma* and *M. stefaninii*, and there is no significant difference. Mr. Bally's specimen bears both flowers and fruit.

KENYA COLONY. 27 miles from Mito Andei, Mzima springs, Tsavo Game Park, on a rocky slope near Tsavo River ; "woody climber, flowers cream, fruits winged" ; Jan. 1950 (fl. fr.), *Bally* 7735.

Marsdenia latifolia (Benth.) K. Schum. in Just, Jahresb. **26** (1), 372 (1900) ; Schltr. Westafr. Kautschuk-Exped. 309 (1900) ; Durand, Syll. Fl. Congol. 365 (1909) ; De Wild. Études Fl. Bangala et Ubangi (Pl. Thonn. Congol. Sér. 2), 371 (1911) ; Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exped. 1910-11, **2**, 14 (1922) ; Hutch. et J. M. Dalz. Fl. W. Trop. Afr. **2**, 60 (1931) ; J. M. Dalz. Useful Pl. W. Trop. Afr. 388 (1937) ; Exell, Cat. Vasc. Pl. S. Tomé, 244 (1944).

Gongronema latifolium Benth. in Hook. Niger Fl. 456 (1849) ; K. Schum. in Engl. Bot. Jahrb. **23**, 236 (1896).

Marsdenia racemosa K. Schum. in Engl. Bot. Jahrb. **17**, 147 (1893) ; Durand et Schinz, Études Fl. Congo, **1**, 194 (1896) ; Hiern in Cat. Afr. Pl. Welw. **1**, 692 (1898) ; N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 425 (1903) ; Norman in Journ. Bot. **67**, Suppl. 2, 97 (1929).

SENEGAL. Without locality, *Leprieur* s.n. (BM).

SIERRA LEONE. Waterloo ; July 1914 (fl.), *Lane-Poole* 316. Fanima, near Njala ; "yellow-green flowers" ; May 1927 (fl.), *Deighton* 681 ; *ibid.* May 1929 (fl.), *Deighton* 1760. Near Mano ; "common climber" ; (fr.), *Deighton* 2428. Near Kambia, Magbema, among trees on edge of rocky stream ; "climber, woody at base, flowers greenish-yellow" ; June 1951 (fl.), *Jordan* 447.

LIBERIA. Without locality, roadside, 300 m. ; "vine with lax panicles of greenish-yellow flowers" ; (fl.), *Harley* 1171.

GOLD COAST. Kwahu, 2000 ft. ; "climber with milky juice, flowers yellow" ; April 1900 (fl.), *Johnson* 649. Ashanti, in deciduous forest ; (fl.), *Irvine* 506. Agogo, Ashanti Akim, in deciduous forest ; April 1928 (fl.), *Irvine* 965. Esheim, between Swedru and Saltpond, in secondary forest ; April 1941 (fl.), *Milne-Redhead* 5052 (spirit collection).

TOGOLAND. Without locality ; (fl.), *Baumann* 465.

NIGERIA. "Interior, Western Lagos" ; 1893 (fl.), *Rowland* s.n. Ikorodu, Yoruba ; March 1899 (fl.), *Schlechter* 13000. Oban ; 1912 (fl.), *Talbot* 1004 (BM), 2072. Erilogbe U.A.C. Camp (Miboma), Sapoba, Beni, at roadside in high forest ; Nov. 1943 (fr.), *Ejiofor* 24664. Ibadan South F.R., about 22 miles south of Ibadan at southern boundary of F.R. near Ijobu-Ode road, in margin tangle at edge of broken forest ; "herbaceous creeper with long straggling stems up to 4 m. long, leaves held erect, glossy dark green above, pale and almost glaucous green below, as are stems, inflorescence axis and calyxlobes, corolla greenish yellow, anthers yellow" ; April 1948 (fl.), *Keay* 22842.

BRITISH CAMEROONS. Bulijambo, Buca, 2500 ft., at the forest edge ; *Maitland* 581.

FRENCH CAMEROONS. Bipinde ; 1911 (fl.), *Zenker* 4047. "Weit nach Norden bis in den Bogen des Lom (Sanaga) vor der Vereinigung mit dem Djerem vorgeschobener Ausläufer der Geschlossener Hylaea um Dengdeng etwa 250 Km. NO Jaunde" ; March 1914 (fl.), *Mildbraed* 8540. Sausane, 5° 30' N., 13° 45' E., about 750 m. ; April

1914 (fl.), *Mildbraed* 8936. Kongola, 6° N., 14° E.; 750–800 m., April 1914 (fl.), *Mildbraed* 9044. Bitye, Yaunde; *Bates* 838 (BM), 1377 (BM).

SAN TOMÉ. *Don* (in herb. Hook., *holotypus speciei*).

GABOON. Nyanga region; June 1914 (fl.), *Le Testu* 1889.

SPANISH GUINEA. Nkotentangan; March 1908 (fl.), *Tessmann* 276.

BELGIAN CONGO. Eala district; May 1936 (fl.), *Louis* 2051.

UGANDA. Kitubulu Forest, near Entebbe, 3900 ft.; "flowers creamy white, setting no fruit, climber 8–10 ft., with milky sap, in thinner vegetation of the forest"; May 1935 (fl.), *Chandler* 1229. Mulange, 4000 ft., in forest road; "flowers fragrant, creamy"; Jan.–Feb. 1920 (fl.), *Dümmer* 4390.

ANGOLA. Queta mountains, in forest; "shrub, climbing high and widely, with a soft pliant lactescent stem, glaucescent foliage and yellowish-white flowers"; Oct. 1855 (fl.), *Welwitsch* 4228. Galungo Alto; (fr.), *Welwitsch* 4229 (BM). Near Calunga, Galungo Alto, in primary forest; "soft, woody, climbing high and widely, milky sap, leaves soft, pallid green, calyx green, corolla pale yellowish-white"; (fl.), *Gossweiler* 4843. Camondai Cazengo, in woods; "suffrutescent climber, branches long and flexible, milky in all parts, calyx green, corolla sulphur-yellow"; Nov. 1909 (fl.), *Gossweiler* 4702 (BM). Lulua River, Lunda; *Pogge* 1249. Floresta húmida do rio Lalege, próximo de Muconda (Nova Chaves) (Lunda meridional); Aug. 1927 (fl.), *Carrisso and Mendonça* 254 (BM).

Hiern (1898) first pointed out that *Gongronema latifolium* and *Marsdenia racemosa* are conspecific but he, like Brown (1903), retained the latter name under the old "Kew" rule. Schlechter (1900), had identified *Gongronema latifolia* as a species of *Marsdenia* whilst working out the plants collected during his west African expedition in search of rubber, but the publication of his transference of the species was antedated* by Schumann who also admitted the correctness of Hiern's synonymy.

Marsdenia latifolia is very strictly confined to humid forest areas and throughout its wide geographical range shows little morphological variation; it is, apparently, a characteristic plant of the tangle at the edges of forest clearings, where shrubby and herbaceous growth affords suitable support for its scrambling habit.

Marsdenia angolensis *N. E. Br.* in *Kew Bull.* **1895**, 258 (1895), et in *Thiselton-Dyer*, *Fl. Trop. Afr.* **4** (1), 423 (1903); Hiern in *Cat. Afr. Pl. Welw.* **1**, 692 (1898); *Mildbr.* *Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exped.* 1907–8, **2**, 545, 618 (1913); Norman in *Journ. Bot.* **67**, Suppl. 2, 97 (1929); *Hutch. et J. M. Dalz.* *Fl. W. Trop. Afr.* **2**, 60 (1931); *Robyns*, *Fl. Sperm. Parc Nat. Albert*, **2**, 107 (1947).

This species has been collected so many times that it seems worth while to record its distribution so far as that is shown by specimens at Kew and at the British Museum. It is a plant of the edges of rain forest and humid fringing forest and its morphological features are remarkably constant.

SIERRA LEONE. Yakala, 1750 ft.; Sept. 1914 (fl.), *Thomas* 2365.

NIGERIA. Bauchi Plateau; "climbing herb with branched, umbel-like inflorescence of greenish flowers, and cordate leaves"; July 1930 (fl.), *Lely* 515.

BELGIAN CONGO. *vide* *Robyns* (1947).

RUANDA. *vide* *Mildbraed* (1913).

UGANDA. Unyoro, 3800 ft.; *Dawe* 767. Mabira Forest; Aug. (fl.), *Ussher* 76. Buzuli, Buvuma District; March 1925 (fl.), *Maitland* 1167. Without locality; *Maitland* 1192. Near Kipango, 4000 ft., in elephant-grass land; "flowers greenish-yellow"; May 1914 (fl.), *Dümmer* 883. Near Banda, 4000 ft., at forest edge; "twiner, flowers cream"; Jan. 1914 (fl., fr.), *Dümmer* 681. Near Nkoko, 4000 ft., in savannah; "twiner,

* The foreword of Schlechter's work is dated "December 1900" and the title-page also carries the date 1900. It was received at Kew on 29 April 1901 and it seems likely that it was actually published early in 1901.—A.A.B.

flowers ochre"; June 1916 (fl.), *Dümmer* 2922. Liwala, 4000 ft., in bush land; "flowers yellow ochre"; Sept. 1920 (fl.), *Dümmer* 4482. Near Mwizi, Ruampara, Ankole, 5400 ft.; "a creeper at forest edge, flowers yellow"; Jan. 1940 (fl.), *Eggeling* 3842. Logiri, West Nile, in forest; "climber, stems lactiferous, semi-succulent, flowers yellow-green"; March 1935 (fl.), *Eggeling* 1661. Mabira Forest, near Mulange, Kyagwe, Mengo, Buganda, 4000 ft.; Aug. 1950 (fl.), *Dawkins* 624. Forest near mouth of Mpanga River, Toro, 3500 ft.; Sept. 1906 (fl.), *Bagshawe* 1216 (BM). Bugoma Forest, Unyoro, 3000 ft.; Dec. 1906 (fl.), *Bagshawe* 1384 (BM). Buvuma Is., Lake Victoria; March 1904 (fl.), *Bagshawe* 644 (BM).

KENYA COLONY. Kibajet estate, Sotik, 6000 ft., at forest edge; "climber, flowers cream" Sept. 1949 (fl.), *Bally* 7472.

TANGANYIKA TERRITORY. Igale-Rungwe, Kyimbila District; "climbing to 8 m., flowers yellowish-green"; Jan. 1913 (fl.), *Stolz* 548.

ANGOLA. Pungo Andongo, in Cabondo thickets in the Praesidium; "herb, climbing extensively on *Vernonia senegalensis*, with yellowish flowers"; March 1857 (fl.), *Welwitsch* 4245 (*lectotypus speciei*, in herb. *Kew.*). Huilla, in woods to the west of Lopolla, 5200 ft.; "twining undershrub, woody at the base, corolla campanulate, rather fleshy, pale yellow-greenish"; Jan. 1860 (fl.), *Welwitsch* 4250. Granja de S. Suiz to Camondai Cazengo; "a suffruticose climber and widely spreading, flowers yellowish-green"; Jan. 1910 (fl.), *Gossweiler* 4647 (BM). Sobato de Quilombo Quiacatubia, Pungo Andongo, rather rare in dense elevated thickets; "ascending lactescent undershrub"; July 1856 (fr.), *Welwitsch* 4254. Cazengo, Loanda; (fl.), *Gossweiler* 717, 4419; (fr.), 4589.

SOUTHERN RHODESIA. Near Salisbury; "stream bank twiner"; Dec. 1936 (fl.), *Eyles* 8828. Umtali, 5000 ft.; Oct. 1951 (fl.), *Chase* 4144.

Mr. H. C. Dawkins has supplied the following information with his No. 624:—"About 4 miles S.E. of Mulange Hill, in a grassy past-cultivation patch known as Kalangala, south of the Jinja-Bugerere road. A sloping hill-side site, on yellow-brown clay-loam soil over dolerite, found as decomposing fragments at 30 cm. depth. A climber on shrubs and trees at the forest edge, where this is spreading into grassland. Associated with *Toddalia*, *Acacia pennata*, *Salacia elegans*, *Hippocratea* spp., *Cantuffa exosa*, *Teclea*, *Combretum guienzii*, *Clausena anisata* and *Albizzia grandibracteata*. Not reached by grass fires. Occasional throughout similar sites around Mabira. A liane, here only in very young stage 3 m. high, but known also to reach upper canopy of high forest. All parts latex-bearing. Flowers entirely green but stigma and anthers paler than the rest. Twining direction as right-hand thread."

Marsdenia crinita Oliv. in Hook. Ic. Pl. t. 1993 (1891); Hiern in Cat. Afr. Pl. Welw. 1, 693 (1898), in obs.; N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. 4 (1), 418 (1903); Norman in Journ. Bot. 67, Suppl. 2, 97 (1929); Hutch. et J. M. Dalz. Fl. W. Trop. Afr. 2, 60 (1931).

SIERRA LEONE. Near Bendembu, Limba; April 1892 (fl.), *Scott Elliot* 5651. Tiama; Jan. 1927 (fr.), *Dalziel* 8095. Yumbuma; "climber, with white fragrant flowers"; April 1940 (fl.), *Deighton* 3944.

GOLD COAST. Apla (Eastern Province), 600 ft., in forest; "a climbing shrub with white flowers"; Oct. 1935 (fl.), *Vigne* 4044.

SOUTHERN NIGERIA. Oyo (Lagos); "large twiner, flowers white"; (fl.), *Barter* 3426. Oyo, Lagos; Sept. 1890 (fl.) *Millson* s.n. (*lectotypus speciei*). Ibadan, on hill above waterworks, in dense bush; "stout woody climber with light brown twigs, not exuding white latex when broken, young growths covered with pale tawny hairs, leaves deep lustrous green above, light green below with very prominent pale nerves, peduncles and calyx pale green, corolla pure white, flowers with an unpleasant foetid-sweet smell"; April 1950 (fl., additional material in spirit), *Meikle* 1430.

GABOON. Nyanga region; 1914 (fl.), *Le Testu* 1852.

PORTUGUESE CONGO. Near Luali-Chiloango (river), Nkanda Mbaku, Maiombe; "a soft woody climber, petals (sic) white"; April 1923 (fl.), *Gossweiler* 9070.

ANGOLA. Galungo Alto, in sylvis edit. mont. de Queto; "herba late scandens, molliter villosa, foliis herbaceis laete viridibus longe ciliatis"; April 1856 (fl.), *Welwitsch* 6201 (BM). Cazengo, Loanda; (sterile), *Gossweiler* 4654; *ibid.*, "an extensive,

suffruticose climber"; Feb. 1910 (sterile), *Gossweiler* 4654 (BM); *ibid.*, Nov. 1911 (fl.), *Gossweiler* 5388 (BM).

S. RHODESIA. Without locality; May 1924 (fl.), *Craster* 210. (This record must be regarded as extremely doubtful since the specimen does not bear Mrs. Craster's original label. It may have been sent from Rhodesia but collected elsewhere).

I have cited *Millson* s.n. as lectotype of the specific name because Oliver (1891) stated that the figure in Hooker's *Icones Plantarum* had been prepared from it. The statement is not strictly accurate, since *Millson's* specimen bears only one floriferous node and two are shown in the figure. The point is of no more than academic interest, for *Millson* collected his specimen at the same locality as *Barter* had found it more than thirty years earlier and the two specimens are clearly conspecific.

SECAMONE R. Br.

My treatment of *S. parvifolia* and *S. stuhlmannii* (*infra*) is a further attempt to provide a means of identification of the numerous specimens which have been received at Kew during the past fifty years and have remained either doubtfully named or left among the *incertae sedis*. Of the two labels "lumper" and "splitter" which have been derisively applied to taxonomists, I much prefer the former, though I (perhaps naively) trust that future research will justify my new synonymy here and elsewhere. It is at least based upon examination of a large number of specimens, some of the more recent of which bear corroborative notes by trained collectors, whereas the original descriptions were frequently based on single, often scrappy, specimens taken by explorers with many preoccupations.

Both of these species are "polymorphic variables"* occurring in savannah or deciduous forest areas, but sometimes finding a place in the more congenial habitat of fringing forests, where they tend to have larger leaves, less indumentum, less congested inflorescences and similar characteristics of shade, as opposed to sun, plants. (See also *Tacazzea apiculata* Oliv., *supra*, p. 354).

A further source of variability which has not hitherto been given its full weight by herbarium workers is artefactual; specimens of different seasonal age tend to present entirely different *facies* when mounted on herbarium sheets, and this, scarcely less than genetic or habitat variation, has led to the description of "bad" species by—of course,—splitters.

Secamone parvifolia (Oliv.) Bullock, comb. nov.

Gymnema parvifolium Oliv. in Trans. Linn. Soc. ser. 2, Bot. **2**, 342 (1887).

Secamone schweinfurthii K. Schum. in Engl. Bot. Jahrb. **17**, 143 (1893), et in Engl. Pflanzenw. Ost Afr. **C**, 325 (1895); N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 284 (1902); Brenan, Forest Trees and Shrubs Tanganyika Terr. (2), 68 (1949); Andrews, Fl. Pl. Anglo-Egypt. Sudan, **2**, 417 (1952).

S. zambesiaca Schltr. in Journ. Bot. **33**, 303 (1895); N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 285 (1902); S. Moore in Journ. Bot. **45**, 51 (1907).

* Wilmott, A. J. 1950. "Geographical distribution and classification". Lectures on the practice of botanical and zoological classification, delivered in the rooms of the Linnean Society. London, pp. 31-48.

S. kirkii N. E. Br. in Kew Bull. **1895**, 248 (1895), et in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 285 (1902).

S. emetica var. *glabra* K. Schum. in Engl. Pflanzenw. Ost Afr. **C**, 324 (1895).

S. usambarica N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 281 (1902); Brenan, l.c.

S. mombasica N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 284 (1902).

S. zambesiaca var. *parvifolia* N. E. Br. in Thiselton-Dyer, Fl. Cap. **4** (1), 544 (1907).

SUDAN. Kulongo, Bongo; July 1869 (fl.), *Schweinfurth* 2232 (typus, *Secamone schweinfurthii* K. Schum.). Bussérie River; "climbing shrub, leaves ovate or almost round with short acute point, flowers pale yellow"; May 1936 (fl.), *Turner* 213. Kondogoi, Yirol District; April 1939 (fl.), *Andrews* 471. Near Lake Nyiropo, Yirol District; April 1939 (fl.), *Andrews* 795.

UGANDA. Dry plains between thickets, Lake Albert rift, 2050 ft.; Sept. 1935 (fl., fr.), *Hancock* 10A. Butiaba flats, Bunyoro; May 1941 (fl.), *Eggeling* 4352; *ibid.*, May 1941 (fl.), *Thomas* 3902; *ibid.*, near Bukumi, 2100 ft.; "climbing shrub with very slender serpentine spreading stems and numerous lateral leaf and inflorescence-bearing branchlets, up to 2 m. high, flowers conspicuous en masse, all parts very pale green but pistil almost white, petals have hollow at base of inner surface, apparently nectaries"; April 1950 (fl.), *Dawkins* 564. Butiaba plain, east shore of Lake Albert; *Bagshawe* 852 (BM).

KENYA COLONY. Zingout, Turkana, 2200 ft.; May 1933 (fl.), *Champion* T.167. Mariakani; 1929 (fl., fr.), *Graham* 1721. Kilifi; 1929 (fr.), *Graham* 1929; *ibid.*, Dec. 1945 (fl.), *Jeffery* K.428. Bura Hill; Feb. 1939 (fr.), *Bally* 8779. Kanjiko, 1750 ft.; Jan. 1942 (fr.), *Bally* 1720. Faio, Northern Province, 3° 30' N., 39° 35' E., about 1000 m.; May 1952 (fl.), *Gillett* 13225. Near Mombasa; *Hildebrandt* 1979 (holotypus, *Secamone mombasica* N. E. Br.). North of Mombasa, to Lamu and Witu; 1908 (young fr.), *Whyte* s.n.

TANGANYIKA TERRITORY. Kilimanjaro, 5000 ft.; 1894 (fl.), *Johnston* s.n. (holotypus speciei). Without locality; 1894 (fl.), *Stuhlmann* 7356. Rufiji; Dec. 1931 (fl.), *Musk* 125. Morogoro, Uluguru Mts., 2000 ft.; Feb. (fl.), *E. M. Bruce* 1141. Mnolela; Dec. 1942 (fl.), *Gillman* 1284. Kitangari, in makonde thicket; March 1943 (fl.), *Gillman* 1319. Maschaua; July 1893 (fl.), *Holst* 3555 (typus, *Secamone emetica* var. *glabra* K. Schum. et *S. usambarica* N. E. Br.). Makuyuni District, West Usambara Mts., 400–1000 m.; June 1935 (young fr.), *Koritschoner* 1166; *ibid.* (fl.), *Koritschoner* 1547. Kwamkembe, Tanga District, 500 ft.; Jan. 1937 (fl.), *Greenway* 4822. Kissessa, Mwanza, 3750 ft.; Aug. 1951 (fr.), *Tanner* 389. Kirumba, Ilemera, Mwanza, 3600 ft.; June 1953 (fr.), *Tanner* 1613. Kibedya, North Kilosa, 2500 ft.; Jan. 1931 (fl.), *Haarer* 1944. Bombo Maji Moto, East Usambara Mts.; March 1941 (fl.), *Greenway* 6140. "Zanzibar"; *Kirk* s.n. (typus, *Secamone kirkii* N. E. Br.). Bushiri Estate, Pangani, 150 ft.; "climbing plant, flowers dull pale yellow"; Feb.–March 1950 (fl.), *Faulkner* 534; *ibid.* "spreading climbing plants, flowers golden yellow"; Dec. 1950 (fl.), *Faulkner* 758.

NYASALAND. Chiromo, Shire River; Jan. 1894 (fl.), *Scott Elliot* 2803 (typus, *Secamone zambesiaca* Schltr.) Chikwawa, Shire River, 16° S.; 1863 (fr.), *Kirk* s.n.

MOGAMBIQUE. Madanda Forest, Batiro; Dec. 1906 (fl.), *Swynnerton* 1921a. Maputo, Goba, Sul do Sare, 100 m.; April 1949 (fr.), *Myze* 675. Lourenço Marques; Dec. 1897 (fl.), *Schlechter* 11669 (typus, *Secamone zambesiaca* var. *parvifolia* N. E. Br.).

NORTHERN RHODESIA. Common in mteche thicket near Nchelengi, Lake Mweru; "scrambling wiry shrub to 20 ft."; April 1951 (fr.), *Bullock* 3836.

SOUTHERN RHODESIA. Melsetter District, on rocky embankment of the Umvumvumu River, 2000 ft.; Dec. 1947 (fl.), *Chase* 464. Ndanga District, in fringe of the Umtilikwe River, 1400 ft.; "climber, flowers golden yellow"; Jan. 1949 (fl., with spirit material), *Wild* 2772.

TRANSVAAL. Strydpoort, Makapansberg; (fr.), *Rehmann* 5410. Waterval River, near Lydenburg; *Wilms* 930 (BM, ex N. E. Br., adnot. in herb. Kew.). Rocky wooded hillside 7 miles north of Assen; April 1951 (fr.), *Codd* 6565. Near Messina, on the Limpopo River; Dec. 1928 (fl.), *Hutchinson* 2122. Hippo Pool, Kruger National Park; June 1939 (sterile), *Mogg* s.n.

The "species" included here are numbers 9, 16, 17, 18 and 19 of Brown's (1902) treatment of the genus in the *Flora of Tropical Africa* and in his key he placed no. 9 next following 16, 17, 18 and 19. All of them were distinguished by minor leaf characters. Brown recorded seven specimens for his five species and the extensive series now available shows that they cannot be separated specifically.

In the herbarium (at any rate at Kew) this species and *S. stuhlmannii* (*infra*) have for many years been sources of confusion; most of the specimens received have been labelled 'near' or 'cf.' one or other of the synonyms according to the locality in which they were collected. The recognition of two species only, instead of the eight of the *Flora of Tropical Africa*, or ten including the additional "species" described by S. Moore, will eliminate this confusion.

The change of the specific epithet to one which has not previously appeared under *Secamone* is unfortunate, since the species is in no way remarkable for the small size of its leaves which are, however, extremely variable in both shape and size.

The measurements given by Brown, or by original authors, together with the number of the specimens from which they were taken, are shown in the accompanying table. It will be seen that both *S. parvifolia* and *S. stuhlmannii* depart from the average in one or two columns more than do the remainder in each group. This is explicable on account of (a) the poverty of the specimen and (b) the inflorescences being in a very young stage.

***Secamone stuhlmannii* K. Schum.** in Engl. Pflanzenw. Ost Afr. **C**, 325 (1895), et in Engl. et Prantl, Naturl. Pflanzenfam. **4** (2), 262 (1895); N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 283 (1902); Brennan, Forest Trees and Shrubs Tanganyika Terr. (2), 68 (1949).

S. whytei N. E. Br. in Kew Bull. **1898**, 308 (1898), et in Thiselton Dyer, Fl. Trop. Afr. **4** (1), 283 (1902).

S. floribunda N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 282 (1902); Brennan, Forest Trees and shrubs Tanganyika Terr. (2), 67 (1949).

S. phillyreoides S. Moore in Journ. Linn. Soc. Bot. **37**, 182 (1905).

S. rariflora S. Moore, *l.c.* 183.

SUDAN. Outskirts of Azza Forest near Mindi; May 1939 (sterile), *Andrews* 1401.

RUANDA. Memba; Sept. 1913 (fl.), *Liben* 614.

UGANDA. Mulema, South Ankole; May, 1903 (fl.), *Bagshawe* 283 (BM) (*typus*, *Secamone phillyreoides* S. Moore). In stream washouts on face of Kigarama Hill, Ruampara, Ankole, 5400 ft.; "flowers yellow-cream"; Oct. 1932 (fl.), *Eggeling* 658 Buvuma Is., Lake Victoria; March 1903 (fl.), *Bagshawe* 646 (BM) (*typus*, *Secamone rariflora* S. Moore).

TANGANYIKA. Kafuro, Karagwe, 1350 m.; March 1891 (fl.), *Stuhlmann* 1894 (*typus speciei*). Kigezi, south of Lake Victoria; (fl.), *Fischer* 396 (*typus*, *Secamone floribunda* N. E. Br.). Kinyasi, Kondo District, 4700 ft.; "climbing plant with yellow flowers and milky latex"; Feb. 1928 (fl.), *Burtt* 914, 957. Dida, Mwanza; Feb. 1933 (fr.), *Rounce* 249. Butenga, Karagwe, about 5000 ft., in termitarium thicket; "creeping shrub with white latex, flowers yellow"; April 1948 (fl.), *Ford* 343. Rirokarindiri, Bukoba District, 4000 ft., in termite thicket; "creeper with latex, flowers yellowish, leaves pale below"; Sept. 1948 (fl.), *Ford* 721. Mwanza District, 3800 ft.; Feb. 1933 (fr.), *Wallace* 663. Usule, Shinyanga; (fl.), *Koritschoner* 1633; (fr.), 1633A.

NYASALAND. Mt. Malosa, 4000-6000 ft.; Nov.-Dec. 1896 (fl.), *Whyte* s.n. (*typus*, *Secamone whytei* N. E. Br.)

Species No. in F.T.A.	"Species"	Petiole mm.	Lamina cm.	Diameter of Gyme cm.	No. of Flowers	Peduncle mm.	Pedicel mm.	Bract mm.	Corolla diameter mm.	Corolla tube mm.	Corolla lobe mm.	Sepal mm.	No. of specimens
9.	<i>S. usambarica</i>	3-4	2-4.5 × 1.3-2.1	1-3	"few"	4-7	3	1.5	4	0.5	1.75	1	1
16.	<i>S. mombasica</i>	3-4	2-3 × 0.5-1.2	0.6-0.8	3-6	2-4	2-3	"minute"	4	0.5	2	1.3	1
17.	<i>S. parvifolia</i>	1.5-2.7	0.8-3.2 × 0.7-2	0.6-0.8	3-6	3-12	2-3	0.7-1	4	0.7	2-2.5	1	2
18.	<i>S. zambesiaca</i>	4-6	3.2-4.5 × 1.6-3.2	1-2	3-8	6-8 or less	2-4	0.7-1	±4	0.7	2	1	2
19.	<i>S. kirkii</i>	3-4	3-8-6	1-2	"few"	3-12	4-7	1	4-5	0.7	2.5	—	1
11.	<i>S. floribunda</i>	"short"	2.5-3.2 × 0.8-1.2	1.3-2.5	"many"	—	3-4	1	4	—	—	1	1
12.	<i>S. whytei</i>	"short"	3.2-6.3 × 0.9-2	±2.5	"many"	—	4-8	0.5-0.7	4	1	1.5	1.3	1
13.	<i>S. stuhlmannii</i>	—	1.4-1.6 × 0.7-0.9	0.4-0.6	5-6	"short"	1-1.5	0.5-1	—	1.6	1.3	1-1.3	1
A.	<i>S. phillyreoides</i>	2	2-2.5 × 0.8-1	1.5-2	"many"	—	3-4	1	2.5	0.5	1.2	1	1
A.	<i>S. rariflora</i>	1	1.5-2 × 0.7-0.8	1-2	"few"	—	—	0.8	—	0.5	2	1	1

Table III. Showing the measurements given by Brown (numbered as in Fl. Trop. Afr.) or by S. Moore (A) for *Secamone parvifolia* (Oliv.) Bullock and *S. stuhlmannii* K. Schum., and their synonyms.

NORTHERN RHODESIA. In dense evergreen *Cryptosepalum pseudotaxus* forest on !Kalahari sand, four miles north of Mayowa Plains, Mwinilinga District ; "woody twiner with slender stems up to 5 m. long, flowers greenish-yellow, sweet scented" ; Oct. 1952 (fl.), *White* 3452 (Forest Herb., Oxford). In undergrowth of dense *Cryptosepalum pseudotaxus* woodland, six miles north of Tshikundulu stream between Mwinilinga and Kabompo ; "slender-stemmed climber, tips of young stems pink-tomentose, flowers small, greenish yellow" ; Oct. 1952 (fl.), *Angus* 605 (Forest Herb. Oxford). Ndola, demonstration plot No. 3, fire protected evergreen thicket dominated by *Syzygium*, *Parinari*, *Brachystegia spiciformis* and *Entandrophragma deleveyi* on very deep red-orange sandy silt loam ; Aug. 1951 (fr.), *Duff* 257/51 (Forest Herb. Oxford).

In the *Flora of Tropical Africa* Brown (1902) separated *S. floribunda* from *S. whytei* and *S. stuhlmannii* on account of its almost glabrous leaves ; he separated *S. whytei* from *S. stuhlmannii* on account of the larger leaves and longer pedicels of the former ; he saw only one specimen of each. So far as I can make out, the chief difference between any of these three and the two species described by S. Moore is that the last two are better specimens.

The specimens cited above show that the size differences used by Brown are of no value ; the indumentum differences are attributable to age and habitat, for the hairs are always of the same kind. An analysis of the sizes of different parts is given in the table on p. 371. The type specimen of *S. rariflora* (and the only one so named in the British Museum herbarium) shows a plant flowering on the current season's growth ; the other specimens cited are older and have more congested cymes.

RAPHIONACME Harv.

Raphionacme splendens Schltr. ; Bullock in Kew Bull. **1953**, 59 (1953).

Three collections of this species are preserved in the British Museum (Natural History) herbarium, all from north-western Tanganyika. *Farquhar* and *Migeod* emphasize the infrequency of the species with the phrases "plant alone" and "only one seen . . .". These additional records are as follows :—

TANGANYIKA TERRITORY. Lake Province, 4500 ft., in rocky ground under trees ; "1 ft. high" ; *Farquhar* 12. Luguru, Kigoma District, Oct. 1925 (fl.), *Grant* s.n. Tendaguru, 6000 ft., in wooded grassland ; "tuber (latex), fleshy herb, flowers violet" ; Dec. 1930 (fl.), *Migeod* 1071.

DIPLOSTIGMA K. Schum.

Diplostigma canescens K. Schum. in Engl. Pflanzenw. Ost Afr. **C**, 324, 1895, et in Engl. et Prantl, Naturl. Pflanzenfam. **4** (2), 256 (1895) ; N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 389 (1903), ex K. Schum.

KENYA COLONY. Lokitaung, Turkana Prov., 3000 ft., in rocky, undulating, scrub country ; "flowers yellow" ; May 1953 (fl.), *Padwa* 210.

TANGANYIKA TERRITORY. Lake Chala, Moshi Distr., Northern Prov., "in Djalla Steppe" ; "Bluten grunlich-gelb" ; Dec. 1932 (fl.), *Geilinger* 4747 ; *ibid.*, "a much branched perennial herb with small green flowers, growing in open *Digitaria-Themedahyparrhenia* grassland in dark brown volcanic soil in very open *Acacia-Lannea-Combretum* association" ; Jan. 1936 (fl.), *Greenway* 4464.

Diplostigma was described by K. Schumann as a monotypic new genus. It was collected by *Fischer*, presumably in northern Tanganyika, but the specimen was unlocalised and it is unlikely that any portion of it has been preserved. The specimens cited above have been identified *ex descriptione*.

Stigmatorhynchus Schltr.

The type species of this genus (lectotype) is clearly *S. hereroensis* Schltr. since Schlechter gave a description of that species and provided diagnostic illustrations, whereas the other two species which he assigned to the genus were merely transferred from *Marsdenia*. The genus is amply distinct on account of its peculiarly rostrate, one-seeded follicles, though it is included in *Marsdenia* by Phillips in his *Genera of South African Flowering Plants* (ed. 2, 617 : 1951). *S. stelostigma* (K. Schum.) Schltr. I have (*supra*, p. 364) returned to *Marsdenia*.

The distribution of the two species is of some interest. *S. hereroensis* is confined to South West Africa and is a somewhat more xerophytic shrub than is *S. umbelliferus*, which is confined to the dry woodlands of central Tanganyika. I regard them as relicts which have survived a common ancestor whose distribution became disrupted by climatic change. Similar speciation is foreshadowed by my subspecific segregation in *Tacazzea venosa* (*supra*, p. 351).

***Stigmatorhynchus umbelliferus* (K. Schum.) Schltr.** in Engl. Bot. Jahrb. **51**, 142 (1913), in obs.

Marsdenia umbellifera K. Schum. in Engl. Bot. Jahrb. **28**, 460 (1900) ; N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4** (1), 422 (1903) ; Brenan, Check List Trees Shrubs Tanganyika Terr. (2), 67 (1949).

TANGANYIKA TERRITORY. Uhehe, 800 m. ; Jan. 1899 (fl.), Goetze 478 (*isotypus*, in herb. Kew.). Madok, on the way to Dodoma ; "a low bush in *Brachystegia* woods" ; Jan. 1926 (fr.), Burt 5399. South side of Chenene Hills, Dodoma Province, about 4100 ft. ; "shrub in *Berlinia* forest" ; Dec. 1927 (fl.), Burt 999. Mpwapwa, on hill slopes ; "shrub 5 ft." ; Jan. 1930 (fl.), Hornby 151 ; *ibid.*, "shrub 4 ft., young stems twine" ; Feb. 1930 (fr.), Hornby 175. Shinyanga Hill, 4000 ft., in *Grewia-Commiphora* thicket on granite boulders ; "close shrub to 7 ft. high with peculiar fruit" ; Feb. 1932 (fr.), Burt 3519. Manyoni, on Kilimatindi Road, 3800 ft., on stony fan-slopes and the face of the scarp, among *Acacia spirocarpa* ; "bushy shrub to 7 ft." ; May 1932 (fr.), Burt 3667. Shinyanga Hill, common in *Commiphora-Grewia* thicket on granite boulder hill ; "shrub 5 ft. high, flowers pale yellow, milky latex" ; Jan. 1933 (fl.), Burt 3789. Shinyanga ; (fr.), Koritschoner 1996.

***Stigmatorhynchus hereroensis* Schltr.** in Engl. Bot. Jahrb. **51**, 142 (1913), *lectotypus nominis generici*.

SOUTH WEST AFRICA. Grootfontein ; Dec. 1908 (fl.), Dinter 917 (photograph of an isotype in herb. Kew.). Near Narnchas ; May 1934 (sterile), Dinter 7226. Near Tsinsabis, Duwit ; (fl.), Boss 35554 (*ex herb. Mus., Transv. in herb. Kew.*).

An isotype specimen was seen by Dr. Phillips, who annotated it as follows in 1940 :—"This may be and probably is the same genus as *Marsdenia* R. Br. It may even be the same species described as *Marsdenia umbellifera* K. Schum." I think there is no doubt that the two species are specifically distinct ; *S. hereroensis* is a more xerophytic shrub, with much smaller leaves ; its inflorescences are fewer-flowered and lack the distinct peduncle of *S. umbellifera*.

Plant Life in Malaya*.—Botanically, Malaya is one of the richest areas of the world, whether its plant wealth be calculated on the number of genera and species in its flora, the structural and physiological diversity of its taxa, or the complexity and lushness of its vegetation. From long personal experience in Malaya, Prof. R. E. Holtum is exceptionally well qualified to describe the general features and the many peculiarities of Malayan plant life. Essentially, the present book* is a series of seventeen more or less distinct essays linked together by the general title. These essays, or chapters, can be read, with few exceptions, independently, since every one deals with one aspect of the varied plant life or one group of plants characteristic of the region. The final chapter, "The Malayan Forest" is, however, unlike the rest in that it describes the general structure and behaviour of the forest vegetation.

Prof. Holtum has, of course, a wide knowledge of Malayan plants but, as is well known, he has specially studied certain taxonomic groups, such as the ferns and orchids on which he has written valuable treatises. As one would expect and wish some prominence is given to these plants which by their abundance occupy a more prominent position in Malaya than in some other parts of the world. Amongst the other subjects discussed are bamboos and other grasses, yams, bananas, climbing plants, water plants, plants and ants, vegetative propagation, flowers and hybrids, and fruits and seeds.

A frontispiece photograph taken in the forest in the Bertam Valley at 4700 feet altitude impresses on one the lush vegetative growth of the tropics where moisture and temperature approximate to optimal values. In addition there are 51 black and white text illustrations. There is a useful list of botanical equivalents of Malay and English plant-names and also an index.

W. B. TURRILL.

* R. E. Holtum, *Plant Life in Malaya*, Longmans, Green & Co., London, New York, Toronto, pp. 254, 1954, 18/-.

In Praise of Paeonies.—In this book* of less than fifty small pages the late James Kelway set out to convey to the amateur gardener his own enthusiasm for the garden paeonies. The book is mainly concerned with the varieties of *Paeonia lactiflora*, many of which the author himself raised, but there is a chapter in which other paeonies—species, garden varieties, and hybrids—are briefly mentioned. What little there is to say about cultivation, is said, and there are notes on the varieties such as one finds in nurserymen's catalogues. The fifteen small (3" × 2½") plates from colour photographs are not very high quality but serve to give some idea of the range and beauty of the flowers. The book is really not much more than a catalogue, and is scarcely worth the half guinea asked for it.

J. ROBERT SEALY

* *Garden Paeonies* by James Kelway. Eyre & Spottiswoode. London. 1954. 10/6.

NEW NAMES IN THE GRAMINEAE.

C. E. HUBBARD.

1. **Catapodium marinum** (L.) C. E. Hubbard, comb. nov.

Festuca marina L. Amoen. Acad. 4 : 96 (1759). *Poa loliacea* Huds. Fl. Angl. 35 (1762). *Triticum maritimum* With. Bot. Arr. Brit. Pl. ed. 2, 1 : 130 (1787). *T. loliaceum* (Huds.) Sm. in Sowerby & Sm., Engl. Bot. 4 : 221 (1795). *T. rottiellia* (rottbolla) Lam. & DC. Fl. Franç. 3 : 86 (1805). *Brachypodium loliaceum* (Huds.) Roem. & Schult. Syst. Veg. 2 : 746 (1817). *Catapodium loliaceum* (Huds.) Link, Hort. Bot. Berol. 1 : 45 (1827). *Festuca rottielloides* Kunth, Rév. Gram. 1 : 129 (1829). *Sclerochloa loliacea* Woods, Tourists' Fl. 411 (1850). *Desmazeria loliacea* (Huds.) Nym. Syll. Fl. Europ. 426 (1855). *Scleropoa loliacea* (Huds.) Godr. & Gren. Fl. France, 3 : 557 (1856). *Festuca rottiellia* (Lam. & DC.) Aschers. & Graebn. Syn. Mitteleurop. Fl. 2 : Abt. 1, 544 (1900). *Desmazeria marina* (L.) Druce in Scott. Bot. Rev. 1 : 156 (1912) ; Rothm. in Fedde, Repert. 52 : 177 (1943).

2. **Catapodium rigidum** (L.) C. E. Hubbard ex Dony, Fl. Bedfordsh. 437 (1953).

Poa rigida L. Fl. Angl. 10 (1854) ; Cent. Pl. 1 : 5 (1755) ; Amoen. Acad. 4 : 96, 265 (1759). *Sclerochloa rigida* (L.) Panz. in Denkschr. Bot. Regensb. 1 : pt. 2, 180 (1816) ; Link, Enum. Pl. Hort. Berol. 1 : 90 (1821). *Glyceria rigida* (L.) Sm. Engl. Fl. 1 : 119 (1824). *Festuca rigida* (L.) Rasp. in Ann. Sci. Nat., 5 : 445 (1825). *Scleropoa rigida* (L.) Griseb., Spic. Fl. Rumel. 2 : 431 (1844). *Desmazeria rigida* (L.) Tutin in Clapham, Tutin & Warburg, Fl. Brit. Is. 1434 (1952).

3. **Gastridium phleoides** (Nees & Meyen) C. E. Hubbard, comb. nov.

Lachnagrostis phleoides Nees & Meyen in Nov. Act. Acad. Caes. Leop. Carol. 19 : Suppl. 1, 146 (1843). *Gastridium lendigerum* var. *longearistatum* Schweinf. in Bull. Herb. Boiss. 2 : App. 2, 30 (1894). *G. oblongum* Coincy in Morot, Journ. de Bot. 13 : 338 (1899).

"Mbulu Clover No. 3."

Mr. F. R. Williams in a recent paper* refers to an indigenous African clover from Tanganyika, known as "Mbulu No. 3.", as showing promise for purposes of pasture improvement at Melsetter, S. Rhodesia. Specimens have now been received from Mr. Williams which prove this plant to be *Trifolium ruepellianum* Fres. (*T. subrotundum* Hochst. & Steud. ex A. Rich.).

J. B. GILLETT.

* Report on the experimental work of the Melsetter Pasture Research Substation. Rhodesian Agr. Journ. 1953. p. 400.

Plant Geography.*—Seated before a blazing log fire in a sound weather-proof bungalow in Sikkim in 1945, and after a succulent dinner, the reviewer's thoughts inevitably turned to that night nearly one hundred years before, when Joseph Hooker camped not far away. *His* shelter was an inclined rock, *his* supper half a yak's kidney, and *he* had no fire. Where Hooker toiled on foot, jeeps now chug along the graded paths ; where he shivered with ague, the traveller keeps malaria at bay with paludrine ; where once no supplies were to be had, now there is abundance. A journey into the wilds of Sikkim is as comfortable as modern transport and tinned food can make it.

With all this convenience, speed and comfort, one would expect that Hooker's performance would have been surpassed—the fact of the matter is that it has never been equalled, and that by a long way.

Hooker brought back from Sikkim a magnificent collection of plants, he made numerous observations on the climate, geology and insect life, he sketched the scenery and he has told us all about it in that best of all travel books "Himalayan Journals". Only a very great man could have done all that in what, to modern ideas, can only be described as shocking conditions. Nevertheless, his account of the vegetation of Sikkim is as fresh and as accurate as if it had been written to-day.

It is Hooker's extraordinary grasp of the broad outlines of vegetation which Dr. Turrill's excellent book keeps constantly before our eyes. Succeeding authors have filled in the details of the vegetation of India, and Hooker's divisions have had to be modified in minor respects, but taking it by and large, his outline of the Vegetation of India remains an astonishing piece of work, whether it be judged by the accurate picture displayed, or by the rapidity with which the salient characters were grasped.

In every country which Hooker visited, the same accurate appreciation of the composition of the various formations is apparent, and his written accounts very often provided the basis for more modern detailed studies. His accounts, even of areas with which he was only acquainted through his study of collections of dried plants, show the same masterly analysis, but of course, here the lack of personal acquaintance with the vegetation is quite obvious.

Dr. Turrill's judicious and apt extracts from Hooker's published work give a vivid picture of a great plant geographer, and these with his own no less interesting explanatory comments combine to form a book which no botanist interested in phytogeography can afford to be without.

N. L. BOR.

* Pioneer Plant Geography. The Phytogeographical Researches of Sir Joseph Dalton Hooker, W. B. Turrill. Vol. 4 of Lotsya—A Biological Miscellany, Martinus Nijhoff N. V., The Hague, Holland, price 19 guilders.